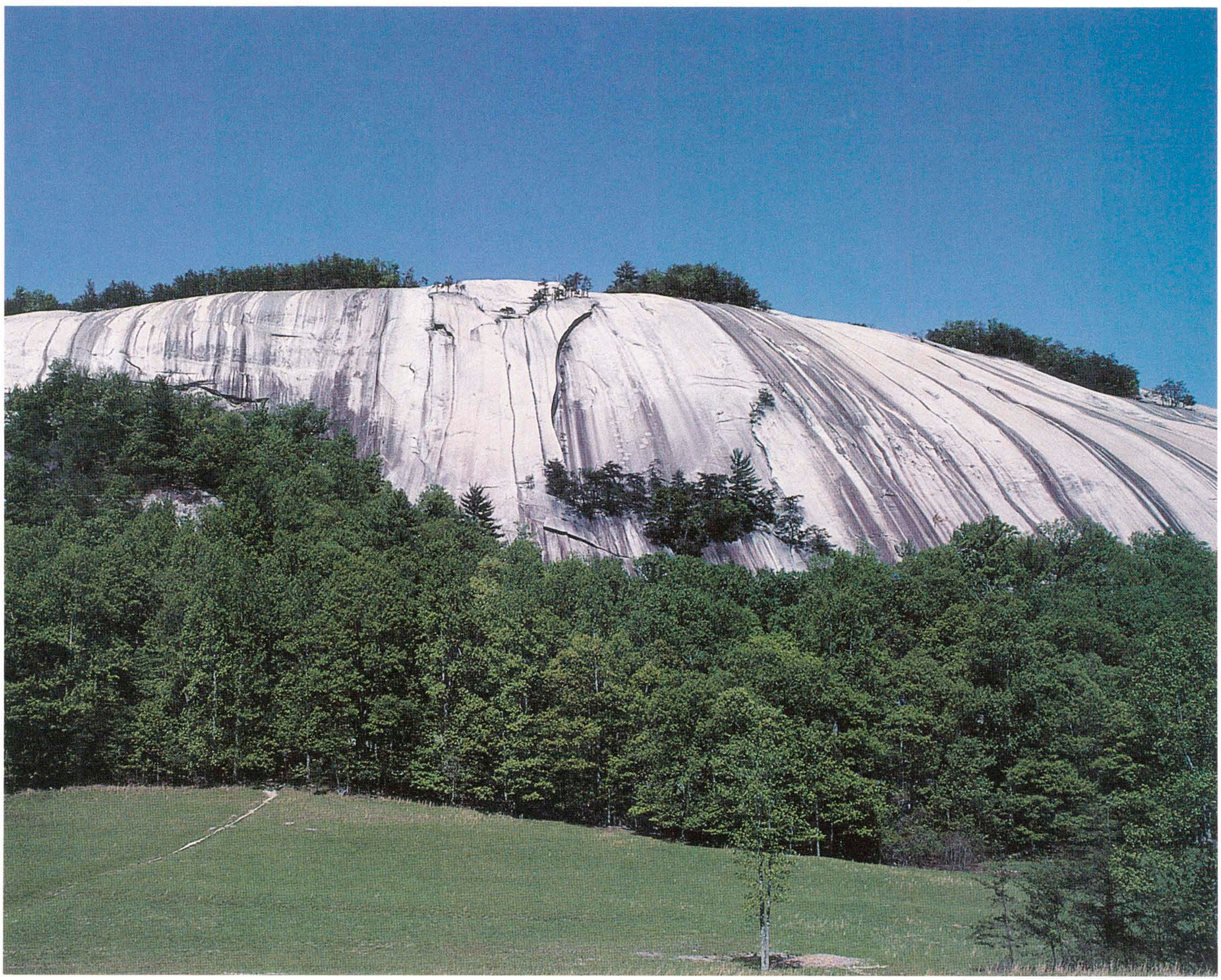
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
North Carolina
Department of
Environment, Health,
and Natural Resources;
North Carolina
Agricultural Research
Service; North Carolina
Cooperative Extension
Service; Wilkes Soil and
Water Conservation
District; and Wilkes
County Board of
Commissioners

Soil Survey of Wilkes County, North Carolina



How To Use This Soil Survey

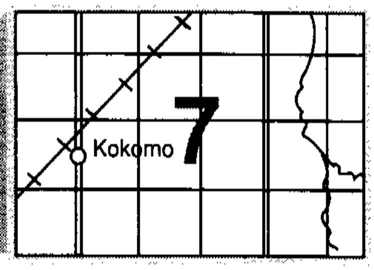
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

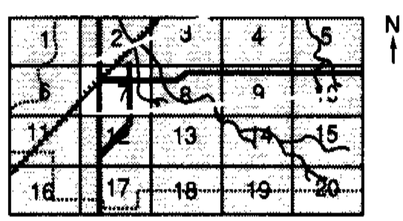
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



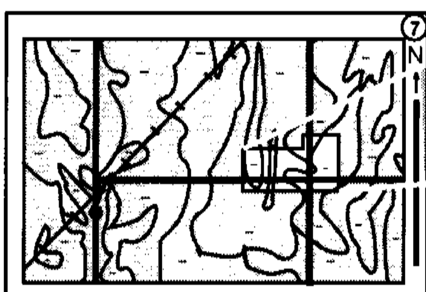
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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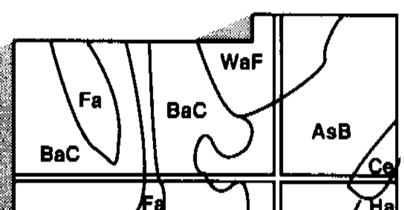

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. This soil survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the Wilkes Soil and Water Conservation District; and the Wilkes County Board of Commissioners. It is part of the technical assistance furnished to the Wilkes Soil and Water Conservation District. The Wilkes County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Stone Mountain, a well-known landmark in Wilkes County, consists of large areas of rock outcrop. This mountain provides, in addition to natural beauty, a large number of activities, including picnicking, camping, hiking, and rock climbing.

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Issued September 1997

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Foreword

This soil survey contains information that can be used in land-planning programs in Wilkes County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various decisions for land use or land treatment. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Richard A. Gallo
State Conservationist
Natural Resources Conservation Service

Soil Survey of Wilkes County, North Carolina

By John W. Tuttle, Natural Resources Conservation Service

Soils surveyed by John W. Tuttle, Edward O. Brewer, J. Michael Ortosky, Jr., Roy L. Mathis, Jr., Robert Maury Brown, Robert C. Kantlehner, and Timothy P. Harlan, Natural Resources Conservation Service, and Robert Marshall Brown, North Carolina Department of Environment, Health, and Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Wilkes Soil and Water Conservation District; and Wilkes County Board of Commissioners

WILKES COUNTY is in the northwestern part of North Carolina (fig. 1) in the Piedmont and Blue Ridge Mountain physiographic regions. The county has a total area of 485,382 acres, or 758 square miles. In 1990, the county has a population of 59,393. Wilkesboro is the county seat. North Wilkesboro is separated from Wilkesboro by the Yadkin River. In 1990, the two towns had a combined population of 5,957 *(19)*.

The first soil survey of Wilkes County was published in 1921 by the U.S. Department of Agriculture. This survey updates the first survey, provides more detailed maps on aerial photographs, and contains more interpretive information *(11)*.

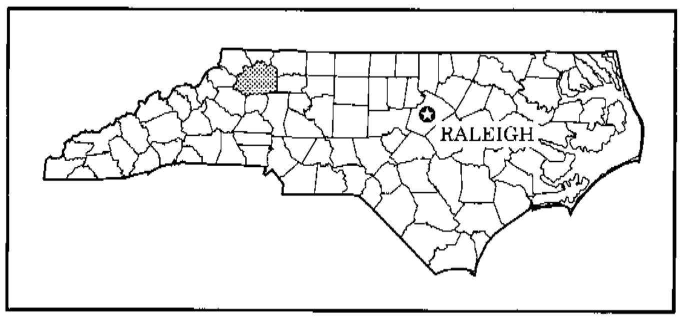

Figure 1.—Location of Wilkes County in North Carolina.

General Nature of the County

This section gives general information about Wilkes County. It describes the history; economic development; physiography, relief, and drainage; water resources; geology and mineral resources; and climate.

History

Wilkes County was created in 1777 from part of Surry County. Its history dates from prerevolutionary times. The county was named in honor of John Wilkes, who was a member of the British Parliament and Lord Mayor of London *(4)*.

The first white settler in the survey area was Christopher Gist, who came to the Yadkin Valley in 1750. Daniel Boone made his home in Wilkes County for many years. Benjamin Cleveland also resided in the area.

In 1847, the town of Wilkesboro was founded. It was reincorporated in 1889. The town of North Wilkesboro was incorporated in 1891. These towns have grown from small agricultural settlements into important industrial and agricultural centers.

Economic Development

Wilkes County has been an important county in North Carolina for agricultural development long before the Civil War. As early as 1840, the leading crops included corn, wheat, rye, oats, tobacco, cotton, and medicinal herbs *(1)*. People also lived off the plentiful game. Most farms had hogs, cattle, and chickens. Small farms provided a living for 95 percent of the people *(21)*. By the beginning of the 20th century, the area of Wilkes County probably shipped more oak and poplar lumber, roots and herbs, green apples, chickens, eggs, dried fruit, leather, and country bacon than any other part of the state *(1)*.

The agriculture of Wilkes County has changed considerably. Poultry, beef cattle, and forest products presently provide a large part of the gross farm income. Generally, hay, tobacco, corn, soybeans, small grain, and orchards provide the remaining income.

The early industries in Wilkes County were related to agriculture. Most communities had grist mills. Sawmills were also common throughout the county because timber was a large and valuable resource. A large tannery, which was in operation in North Wilkesboro in the early 20th century, increased the need for valuable timber.

Agriculture still plays an important role in the county's economy, but, in recent years, the furniture, textile, and general manufacturing industries and the poultry industry have become increasingly important. Industry is currently the largest source of employment in the county. According to the North Carolina Department of Revenue, retail sales in Wilkes County reached approximately 396 million dollars in 1991. According to the North Carolina Agricultural Extension Service, the gross farm income was approximately 170 million dollars in 1993.

Physiography, Relief, and Drainage

The terrain of Wilkes County varies greatly from nearly level flood plains to almost vertical rock cliffs. The physiography of the county consists of mountains, foothills, piedmont ridges, stream terraces, and flood plains.

Mountain landscapes range from about 1,250 to 4,100 feet in elevation. Soils on the broad ridges of mountains commonly are moderately deep to very deep and have a loamy subsoil, but some soils on the broadest ridges have a clayey subsoil. Soils on the narrow ridges and knobs commonly are shallow to moderately deep and have a loamy subsoil. Soils on side slopes generally have loamy a subsoil and in some areas are shallow and very stony. Rock outcrops are scattered throughout the mountains. In coves and along narrow flood plains in the mountains, soils are very deep and commonly have more moisture and a higher water-holding capacity than soils on the adjacent mountains.

The foothills are a transitional area between the mountains and the Piedmont. This area commonly has diverse relief and includes discontinuous mountains and hills that are intermingled with the Piedmont. The foothills do not have elevations as high as the mountains, but they do have narrow ridges and steep or very steep side slopes, which are common in the mountains. Some areas of the foothills have broad ridges, which are common on the Piedmont, but they have elevations that are generally higher than those of the Piedmont. The terrain is rugged in places, commonly near large streams.

The Yadkin River Valley and the central and eastern parts of the county are in the Southern Piedmont Major Land Resource Area. The Piedmont section of the county generally has broad ridges. Most of the soils on the broad ridges are generally very deep and have a clayey subsoil. Soils on the moderately steep side slopes have a loamy to clayey subsoil. Soils on the steep and very steep side slopes have a loamy subsoil. Most areas on the flood plains are cleared and used for hayland and pasture or for small grain, and some are used for row crops.

Elevations range from 880 feet in the eastern part of the county where the Yadkin River flows out of the county to 4,100 feet in the western part of the county at Thompkins Knob. Areas are gently sloping to very steep in the uplands and nearly level on the flood plains, except along the larger rivers where the flood plains are wider and are nearly level or gently sloping.

All of the county is drained by the Yadkin River and its tributaries. The Yadkin River enters the county from the southwest, flows directly across the county, and exits to the northeast. The W. Kerr Scott Reservoir is on the Yadkin River, directly west of Wilkesboro. The Yadkin River's major tributaries include the Reddies and Roaring Rivers and Mulberry, Lewis Fork, Stony Fork, Elk, Beaver, Warrior, Moravian, Hunting, and Elkin Creeks.

Water Resources

Wilkes County has an abundant supply of water from rivers, streams, lakes, and ground water. Most of the water used for domestic purposes is obtained from drilled and bored wells. Most of the water used for industrial and residential purposes in areas of Wilkesboro and North Wilkesboro is supplied by water systems deriving water from the Yadkin River and the Reddies River, respectively. About 1,470 acres of

Wilkes County is in the W. Kerr Scott Reservoir, which is located west of Wilkesboro on the Yadkin River.

Geology and Mineral Resources

Carl E. Merchat, geologist, N.C. Department of Environment, Health, and Natural Resources, Division of Land Resources, Geologic Survey Section, prepared this section.

Wilkes County is located in the Blue Ridge and Piedmont physiographic provinces of the Appalachian Mountain System. The steep, rugged terrain that marks differences in elevation and landscape between the two provinces is an escarpment called the Blue Ridge Front. This escarpment resulted because the headward erosion caused by streams flowing to the Atlantic Ocean was more rapid than the erosion caused by streams flowing west into the Gulf of Mexico.

The Blue Ridge Front is more extensively developed in the western part of Wilkes County than anywhere else in North Carolina. The easternmost edge of this front has an elevation of approximately 1,500 feet. It marks the boundary between the two physiographic provinces.

The boundary between two major northeast-trending geologic belts in Wilkes County does not coincide with the boundary between the physiographic provinces. Both the Blue Ridge Belt and the Inner Piedmont Belt consist of metamorphosed sedimentary, volcanic and plutonic rocks that originally were such rock types as graywacke (dirty sandstone), shale, conglomerate, mafic and felsic volcanic rock, and granite to quartz diorite.

The age of the older rocks ranges from 500 million to a billion years old. The older rocks were intruded by younger plutonic rocks. Stone Mountain is a large granodiorite exfoliation dome. It is a late intrusion and dated at 390 million years.

Geologically, the Brevard Fault Zone separates the Blue Ridge Belt from the Inner Piedmont Belt. This fault zone is 1 to 4 miles wide and extends from Elkville to near Pleasantville. It is an area of intense shearing caused by ancient movements of one part of the earth's crust against an adjoining part. When this movement occurs a characteristic rock—a mylonite—is produced. Mylonites have a texture that is crushed or streaked out. This fault zone and all other faults shown on the geologic map are ancient and inactive and have been recrystallized.

The composition, structure, and areal extent of the rocks control local topography. For example, the Brushy Mountains and Stone Mountain are resistant remnants of a mountainous area that was previously much higher and broader. Generally, the granitic and sillimanite-quartz-rich rocks weather and erode at a slower rate than the nearby biotite and hornblende-rich rocks and thus are more resistant.

The only mineral commodities currently mined in Wilkes County are crushed stone and sand and gravel. In the mountains and the Piedmont in North Carolina, crushed stone is usually quarried from rocks that are high in feldspar and have smaller amounts of quartz, mica minerals, and hornblende. The granitic rock units and the more feldspathic phases of other rock units in the county may be suitable for crushed stone. In the building industry, sand and gravel are commonly an alternate for crushed stone. They are dredged from the Reddies and Yadkin Rivers. Crushed stone and sand and gravel are low-cost, large-volume materials. Because transportation costs make up a large percentage of the total cost of the products, selected sources should be located near areas of use or growth. In addition, extensive planning is needed in selecting the proper quarry site because a quarry can significantly impact the environment.

Historically, sheet mica and asbestos were produced in the western part of Wilkes County. Sheet mica was mined from pegmatites, and asbestos from altered ultramafics. Sillimanite, which occurs in the various schist units in the county, is another mineral that has some economic potential.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at North Wilkesboro, North Carolina, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 37 degrees F and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred on January 21, 1985, is -9 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred on August 22, 1983, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total average annual precipitation is about 50 inches. Of this, 26 inches, or about 53 percent, usually falls in April through September. The growing season

for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 15 inches. The heaviest 1-day rainfall during the period of record was 8.55 inches on June 20, 1967. Thunderstorms occur on about 45 days each year, and most occur in July.

The average seasonal snowfall is about 10 inches. The greatest snow depth at any one time during the period of record was 17 inches, and the heaviest 1-day snowfall on record was 14 inches. On an average of 3 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 64 percent of the time possible in summer and 54 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in Wilkes County. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the material from which the soil formed.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads,

and rivers, all of which help in accurately locating boundaries.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" *(13, 17)*.

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs taken in 1966 at a scale of 1:15,840. United States Geological Survey geologic and topographic maps at a scale of 1:24,000 were also used. Map units were then designed according to the pattern of soils interpreted from photographs, maps, and field observations.

Samples for chemical and physical analyses were taken from the selected pedons of major soils in the survey area. Some of the analyses were made by the Soil Survey Laboratory, Lincoln, Nebraska. Some soils were analyzed by the North Carolina State University Soils Laboratory, Raleigh, North Carolina. Selected physical analyses of many pedons were made by the Wilkes County Soil Survey Staff. Commonly used laboratory procedures were followed *(16)*.

The results of the analyses of selected soils are given in table 17.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to orthophotographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from 7.5-minute topographic maps of the United States Geological Survey.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Pacolet-Rion

Gently sloping to steep, well drained soils that have a predominantly clayey or loamy subsoil; on piedmont uplands

The landscape is characterized by gently sloping to strongly sloping ridgetops that are separated by moderately steep and steep side slopes (fig. 2). Slopes dominantly range from 2 to 60 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are mainly used as cropland, such as for tobacco or corn, or as pasture and hayland. Areas on the steeper side slopes are commonly forested. Most roads are parallel to the ridgetops.

This map unit makes up about 46 percent of Wilkes County. It is about 67 percent Pacolet soils, 20 percent Rion soils, and 13 percent soils of minor extent.

The gently sloping to moderately steep Pacolet soils are on ridgetops and side slopes. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss and schist. Typically, the surface layer is eroded sandy clay loam on slopes of less than 15 percent and sandy loam on slopes greater than 15 percent.

The strongly sloping to steep Rion soils are typically on side slopes. In some areas these soils are on strongly sloping ridgetops or on knobs. They are very deep and well drained. They have a loamy subsoil and formed in material weathered from gneiss and schist. Typically, the surface layer is fine sandy loam.

The minor soils include Chewacla, Toccoa, Wateree, Hibriten, and Masada soils. Chewacla and Toccoa soils are on flood plains. Chewacla soils are frequently flooded and are somewhat poorly drained. Toccoa soils are occasionally flooded. Wateree soils are on steep and very steep side slopes. Wateree and Hibriten soils have soft bedrock at a depth of 20 to 40 inches. Hibriten soils are moderately deep. Masada soils have a predominantly clayey subsoil. They are on old high stream terraces and are very deep.

The main management concerns affecting woodland production in areas of the Pacolet and Rion soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. Seedling mortality is an additional management concern in eroded areas of the Pacolet soils.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. Most areas of the Pacolet soils have eroded because of many years of cropping. In these areas, erosion of the topsoil has resulted in poor tilth.

The slope is the main management concern affecting most urban uses in areas of this map unit that have slopes greater than 8 percent. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. A high content of clay and low strength in the subsoil are additional limitations affecting some urban uses in areas of the Pacolet soils.

2. Evard-Cowee-Chestnut

Strongly sloping to very steep, well drained soils that have a loamy subsoil; on mountain uplands at elevations between 1,250 and 3,500 feet

The landscape is characterized by strongly sloping to

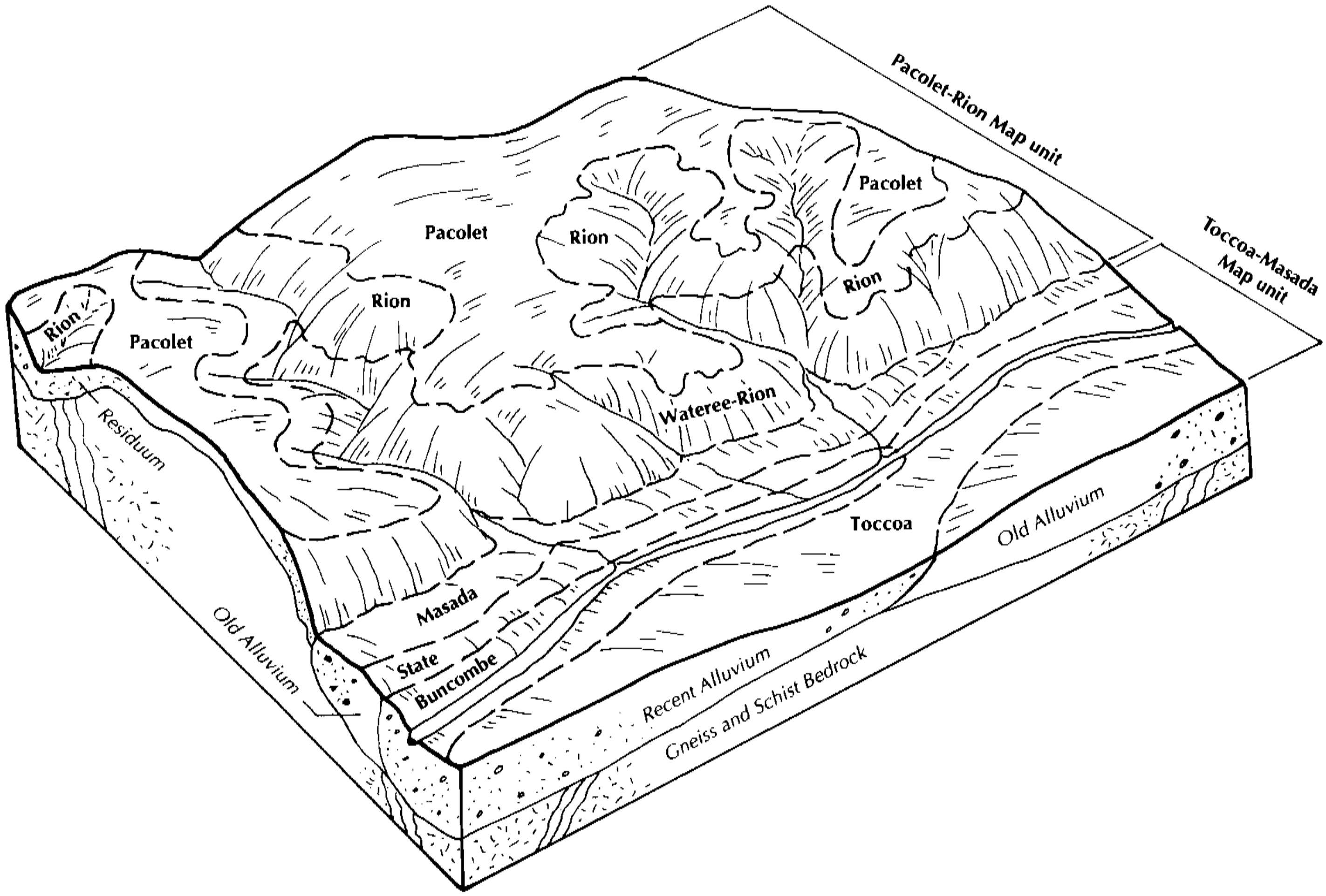

Figure 2.—The relationship of soils and landscape in adjoining areas of the Pacolet-Rion and Toccoa-Masada general soil map units.

moderately steep mountain ridgetops that are separated by steep and very steep mountain side slopes. Slopes dominantly range from 6 to 90 percent. Streams flow rapidly in winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or along the contour of the side slopes.

This map unit makes up about 18 percent of Wilkes County. It is about 47 percent Evard soils, 25 percent Cowee soils, 13 percent Chestnut soils, and 15 percent soils of minor extent.

The strongly sloping to steep Evard soils are on the smooth and wide parts of ridgetops and on the smooth and low parts of side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The strongly sloping to steep Cowee soils are on knobs, narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep to soft bedrock and are well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The strongly sloping to very steep Chestnut soils are on knobs, very narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep to soft bedrock and are well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The minor soils include Hayesville, Ashe, Cleveland, Edneyville, Saluda, Braddock, Tate, Greenlee, Ostin, Reddies, Rosman, and Cullowhee soils. Braddock soils are predominantly on colluvial foot slopes. Hayesville soils are on strongly sloping ridgetops. Braddock and

Hayesville soils have a predominantly clayey subsoil. Ashe, Cleveland, Edneyville, and Saluda soils are on ridgetops and side slopes. Ashe soils are moderately deep to hard bedrock. Cleveland soils are shallow to hard bedrock. Edneyville soils are very deep. Saluda soils are shallow to soft bedrock. Tate soils are on stream terraces and foot slopes. Greenlee soils are in colluvial valleys and contain large rock fragments throughout. The very deep Ostin, Reddies, and Rosman soils are on nearly level and gently sloping mountain flood plains and in valleys. The depth to gravelly or cobbly underlying material is less than 20 inches in Ostin soils, ranges from 20 to 40 inches in Reddies soils, and is more than 40 inches in Rosman soils. Cullowhee soils are on narrow flood plains and are somewhat poorly drained. They have gravelly or cobbly underlying material at a depth of 20 to 40 inches.

The main management concerns affecting woodland production in areas of the Evard, Cowee, and Chestnut soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. A windthrow hazard is an additional limitation in all areas of the Cowee and Chestnut soils because of the moderate depth to bedrock.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. Operating farm equipment is difficult and dangerous in the steep and very steep areas. In addition, many areas have scattered stones on the surface.

The slope is the main management concern affecting urban uses in this map unit. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. The moderate depth to bedrock in the Chestnut and Cowee soils is a limitation affecting some urban uses. The scattered stones on the surface in many areas are an additional limitation affecting some uses.

3. Chestnut-Ashe-Edneyville

Strongly sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on mountain uplands at elevations between 2,000 and 4,100 feet

The landscape is characterized by strongly sloping and moderately steep mountain ridgetops that are separated by steep and very steep mountain side slopes. Slopes dominantly range from 8 to 90 percent. Streams flow rapidly in winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or along the contour of the side slopes.

This map unit makes up about 12 percent of Wilkes County. It is about 48 percent Chestnut soils, 16 percent Ashe soils, 12 percent Edneyville soils, and 24 percent soils of minor extent.

The strongly sloping to very steep Chestnut soils are on knobs, narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep to soft bedrock and are well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The strongly sloping to very steep Ashe soils are on knobs, very narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep to hard bedrock and are somewhat excessively drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The strongly sloping to steep Edneyville soils are on the smooth and wide parts of ridgetops and on the smooth and low parts of side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The minor soils include Cleveland, Evard, Cowee, Saluda, Tate, Cullasaja, Greenlee, Ostin, and Cullowhee soils. Cleveland and Saluda soils are on ridgetops and side slopes. Cleveland soils are shallow to hard bedrock. Saluda soils are shallow to soft bedrock. Evard and Cowee soils are on the broader ridgetops. Evard soils are very deep. Cowee soils are moderately deep. Tate soils are on stream terraces and foot slopes. Cullasaja and Greenlee soils contain large rock fragments throughout. Cullasaja soils are colluvial and in coves. Greenlee soils are in colluvial valleys and coves. Ostin soils are on mountain flood plains and have gravelly or cobbly underlying material within a depth of 20 inches. Cullowhee soils are on narrow flood plains, are somewhat poorly drained, and have gravelly or cobbly underlying material within a depth of 20 to 40 inches. Rock outcrops also occur in this map unit.

The main management concerns affecting woodland production in areas of the Chestnut, Ashe, and Edneyville soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. A windthrow hazard is an additional limitation in all areas of the Chestnut and Ashe soils because of the moderate depth to bedrock.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. Operating farm equipment is difficult and dangerous in the steep and

very steep areas. In addition, many areas have scattered stones on the surface.

The slope is the main management concern affecting urban uses in this map unit. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. The moderate depth to bedrock in the Chestnut and Ashe soils is a limitation affecting some urban uses. The scattered stones on the surface in many areas are an additional limitation affecting some uses.

4. Evard-Cowee

Strongly sloping to steep, well drained soils that have a loamy subsoil; on mountain uplands at elevations between 1,250 and 2,500 feet

The landscape is characterized by strongly sloping and moderately steep mountain ridgetops that are separated by steep mountain side slopes. Slopes dominantly range from 6 to 60 percent. Streams flow rapidly in winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. A small percentage is used for orchards. Most roads are parallel to the ridgetops or along the contour of the side slopes.

This map unit makes up about 14 percent of Wilkes County. It is about 53 percent Evard soils, 22 percent Cowee soils, and 25 percent soils of minor extent.

The strongly sloping to steep Evard soils are on the smooth and wide parts of ridgetops and on the smooth and low parts of side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The strongly sloping to steep Cowee soils are on knobs, narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep to soft bedrock and are well drained. They have a loamy subsoil and formed in residuum weathered predominantly from schist and gneiss. Typically, the surface layer is gravelly sandy loam.

The minor soils include Hayesville, Saluda, Chestnut, Braddock, Tate, and Cullowhee soils. Hayesville and Braddock soils have a predominantly clayey subsoil. Hayesville soils are on strongly sloping ridgetops. Braddock soils are dominantly on colluvial foot slopes. Saluda and Chestnut soils are dominantly on side slopes and knobs. Saluda soils are shallow to soft bedrock. Chestnut soils are moderately deep to soft bedrock. Tate soils are on stream terraces and foot slopes. Cullowhee soils are on narrow flood plains and are somewhat poorly drained.

The main management concerns affecting woodland production in areas of the Evard and Cowee soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. A windthrow hazard is an additional limitation in all areas of the Cowee soils because of the moderate depth to bedrock.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. Operating farm equipment is difficult and dangerous in the steep areas. In addition, many areas have scattered stones on the surface.

The slope is the main management concern affecting urban uses in this map unit. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. The moderate depth to bedrock in the Cowee soils is a limitation affecting some urban uses. The scattered stones on the surface in many areas are an additional limitation affecting some uses.

5. Toccoa-Masada

Nearly level to strongly sloping, well drained soils that have loamy underlying material or a predominantly clayey subsoil; on piedmont flood plains and high stream terraces adjacent to the Yadkin River, Hunting Creek, and Lewis Fork Creek

The landscape is characterized by nearly level and gently sloping flood plains and by gently sloping to strongly sloping high stream terraces occurring among and adjacent to the flood plains (fig. 2). Slopes range from 0 to 15 percent. Streams flow in winding courses through the broad, piedmont flood plains.

Most of this map unit is cleared and used as cropland or as pasture and hayland. The rest is used as woodland. Most roads are parallel to and slightly above the flood plains or are slightly raised and across the flood plains.

This map unit makes up about 3 percent of Wilkes County. It is about 29 percent Toccoa soils, 22 percent Masada soils, and 49 percent soils of minor extent.

The nearly level Toccoa soils are on the smooth and wide parts of the flood plains, commonly away from the riverbanks. These soils are very deep and well drained. They have loamy underlying material and formed in recent alluvium. Typically, the surface layer is sandy loam.

The gently sloping to strongly sloping Masada soils are on broad to narrow ridgetops and side slopes on old high stream terraces. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in old alluvium derived from surrounding uplands. Typically, the surface layer is sandy clay loam.

The minor soils include Buncombe, Chewacla, State,

Dogue, Pacolet, and Rion soils. Buncombe soils are on flood plains, generally next to rivers or creeks, and are excessively well drained. They have sandy underlying material. Chewacla, State, and Dogue soils are on flood plains. They have a loamy subsoil. Chewacla soils are somewhat poorly drained and are frequently flooded. State soils are well drained, and Dogue soils are moderately well drained. State and Dogue soils are on low terraces. Dogue soils have a predominantly clayey subsoil. Pacolet and Rion soils are upland soils on adjoining side slopes.

No major management concerns affect woodland management in areas of the Toccoa soils. Seedling mortality is a management concern in areas of the Masada soils because these soils are eroded and have a clayey subsoil. Occasional flooding on the Toccoa soils and the predominantly clayey subsoil in the Masada soils affect the timing of management practices.

The occasional flooding is a management concern affecting crops and pasture in areas of the Toccoa soils. A hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in areas of the Masada soils. The Masada soils have eroded because of many years of cropping and have poor tilth. Some areas are gravelly and have equipment limitations.

Because of the occasional flooding on the Toccoa soils, this map unit is unsuited to most urban uses. However, some areas directly below the W. Kerr Scott Reservoir Dam along the Yadkin River have urban buildup. The dam provides flood protection but does not eliminate the possibility of floods. The main management concerns affecting urban uses in areas of the Masada soils are the gravelly surface layer, the hazard of erosion, the clayey subsoil, a moderate shrink-swell potential, and low strength in the subsoil.

6. Tate-Braddock-Rosman-Cullowhee

Nearly level to moderately steep, well drained and somewhat poorly drained soils that have a loamy or predominantly clayey subsoil or underlying material; on colluvial fans, foot slopes, and flood plains of mountain valleys

The landscape is characterized by nearly level and gently sloping flood plains and streambeds and by gently sloping to moderately steep colluvial fans and stream terraces adjacent to the flood plains in the mountain valleys (fig. 3). Slopes range from 0 to 25 percent. Streams flow in winding courses through narrow to fairly broad flood plains in the mountains.

Most of this map unit is cleared and used as pasture and hayland or as cropland. The rest is used as woodland. Most roads are parallel to and slightly above the flood plains and colluvial areas.

This map unit makes up about 3 percent of Wilkes County. It is about 26 percent Tate soils, 19 percent Braddock soils, 12 percent Rosman soils, 11 percent Cullowhee soils, and 32 percent soils of minor extent.

The gently sloping to moderately steep Tate soils are on foot slopes and fans adjoining flood plains and streambeds. These soils are very deep and well drained. They have a loamy subsoil and formed in colluvium and old alluvium. Typically, the surface layer is fine sandy loam.

The gently sloping to moderately steep Braddock soils are on foot slopes and toe slopes adjoining flood plains and streambeds. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in old colluvium and alluvium. Typically, the surface layer is clay loam.

The nearly level Rosman soils are generally on broad flood plains. These soils are very deep and well drained. They have a loamy subsoil and formed in recent alluvium. Typically, the surface layer is fine sandy loam.

The nearly level Cullowhee soils are generally on broad flood plains and in depressions. These soils are very deep and somewhat poorly drained. They have loamy underlying material that is underlain by gravelly or cobbly material between depths of 20 and 40 inches. They formed in recent alluvium. Typically, the surface layer is fine sandy loam.

The minor soils include Greenlee, Ostin, Reddies, Evard, Cowee, Chestnut, and Edneyville soils. Greenlee soils are in colluvial valleys in the more sloping areas and contain large rock fragments throughout. Ostin and Reddies soils are on nearly level and gently sloping mountain flood plains and in valleys. Ostin soils have gravelly or cobbly underlying material within a depth of 20 inches. Reddies soils are moderately well drained and have gravelly or cobbly underlying material between depths of 20 and 40 inches. Evard, Cowee, Chestnut, and Edneyville soils are dominantly on residual side slopes. Evard and Edneyville soils are very deep. Cowee and Chestnut soils are moderately deep to soft bedrock.

A hazard of erosion and the equipment limitation, which are caused by the slope, are the main management concerns affecting woodland management in areas of the Tate and Braddock soils. Seedling mortality is a management concern in areas of the Braddock soils because these soils are eroded and have a clayey subsoil. Occasional flooding on the Rosman soils affects the timing of management

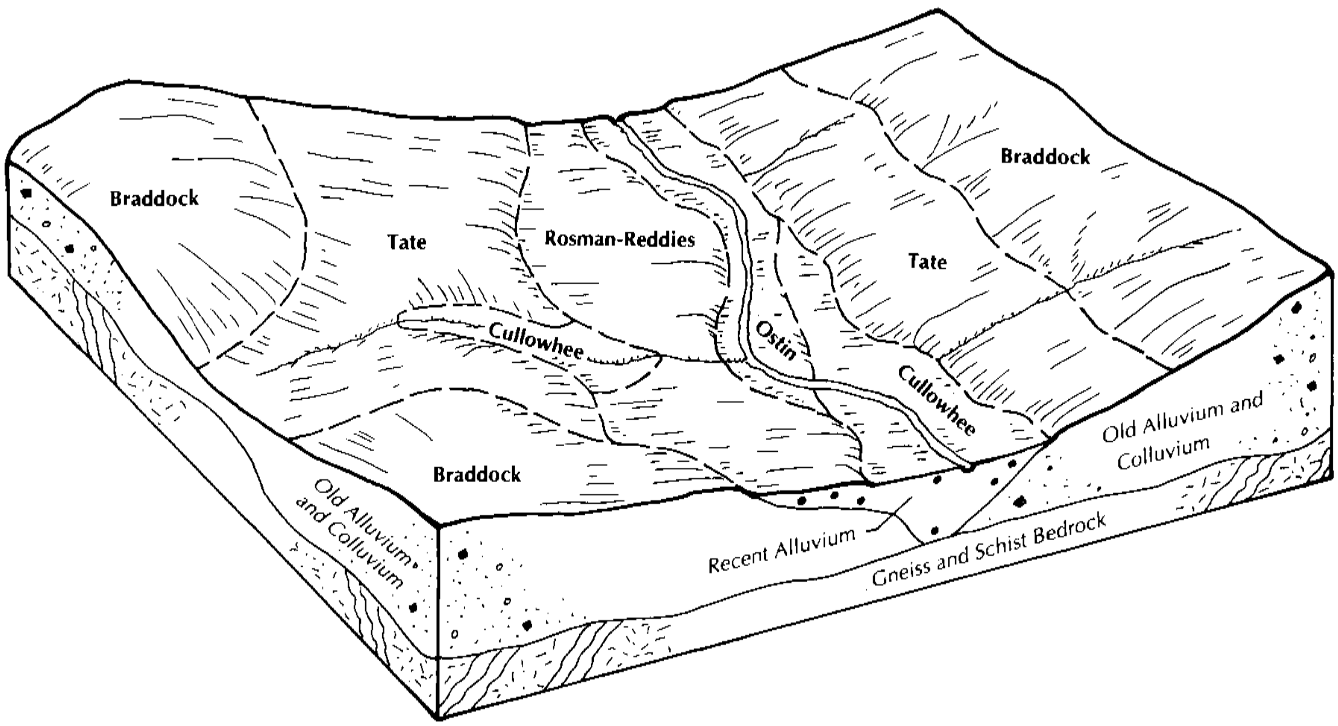

Figure 3.—The relationship of soils and landscape in the Tate-Braddock-Rosman-Cullowhee general soil map unit.

practices. Frequent flooding and wetness in areas of the Cullowhee soils are also major management concerns.

The main management concern affecting crops and pasture in areas of the Tate and Braddock soils is the hazard of erosion, which increases as slope increases. The Braddock soils have eroded because of many years of cropping and have poor tilth. Flooding on the Rosman and Cullowhee soils is a major management concern affecting cropland. Wetness is also a problem in areas of the Cullowhee soils, and drainage is necessary for most crops on these soils.

The slope and the hazard of erosion are the main management concerns affecting urban uses in areas of the Tate and Braddock soils. A moderate shrink-swell potential and low strength in the clayey subsoil are additional problems in areas of the Braddock soils. Because of the flooding, the Rosman and Cullowhee soils are unsuited to most urban uses.

7. Pacolet-Masada

Gently sloping to moderately steep, well drained soils that have a predominantly clayey subsoil; on piedmont uplands and ancient river terraces

The landscape is characterized by broad, gently sloping ridgetops that are separated by strongly sloping and moderately steep side slopes. Slopes dominantly range from 2 to 25 percent. The drainageways join and become creeks that flow through narrow and moderately wide flood plains. In some areas they are bordered by steep side slopes.

The less sloping parts of this map unit are mainly used as cropland or as pasture and hayland. Areas on the steeper side slopes are commonly forested. Most roads are parallel to the ridgetops.

This map unit makes up about 2 percent of Wilkes County. It is about 42 percent Pacolet soils, 21 percent Masada soils, and 37 percent soils of minor extent.

The gently sloping to moderately steep Pacolet soils are on ridgetops and side slopes. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss and schist. Typically, the surface layer is eroded sandy clay loam on slopes of less than 15 percent and sandy loam on slopes greater than 15 percent.

The gently sloping to strongly sloping Masada soils are on broad ridgetops. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in old alluvium on high stream terraces. In some localized areas only an alluvial cap remains over the residual soil material. Typically, the surface layer is eroded sandy clay loam.

The minor soils include Chewacla, Braddock, Tate,

Rosman, and Rion soils. Chewacla soils are on flood plains and are frequently flooded. Braddock, Tate, and Rosman soils are in areas where the mountains join the Piedmont. Braddock and Tate soils are on colluvial benches. Rosman soils are on flood plains, commonly next to streams, and are well drained. Rion soils are on moderately steep and steep side slopes. They have a loamy subsoil. Also included are a few small areas of soils that have dark red to dark reddish brown topsoil and a dark red subsoil.

The main management concerns affecting woodland production in areas of the Pacolet soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. Seedling mortality is an additional management concern in eroded areas of the Pacolet and Masada soils.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. Most areas of the Pacolet and Masada soils have eroded because of many years of cropping. In these areas, erosion of the topsoil has resulted in poor tilth.

The slope is the main management concern affecting most urban uses in areas of this map unit that have slopes greater than 8 percent. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. The high content of clay and low strength in the subsoil are additional limitations affecting some urban uses in areas of the Pacolet and Masada soils. The moderate shrink-swell potential in the subsoil is also a limitation in areas of the Masada soils.

8. Rion-Wedowee

Strongly sloping to steep, well drained soils that have a loamy or predominantly clayey subsoil; on piedmont uplands

The landscape is characterized by strongly sloping ridgetops that are separated by strongly sloping to steep side slopes. Slopes dominantly range from 5 to 60 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are mainly used as cropland or as pasture and hayland. Areas on the steeper side slopes are commonly forested. Most roads are parallel to the ridgetops.

This map unit makes up about 1 percent of Wilkes County. It is about 58 percent Rion soils, 10 percent Wedowee soils, and 32 percent soils of minor extent.

The strongly sloping to steep Rion soils are on ridgetops and side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in residuum weathered predominantly from granitic gneiss and granodiorite. Typically, the surface layer is fine sandy loam.

The strongly sloping Wedowee soils are on the broadest part of ridgetops. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in residuum weathered predominantly from granitic gneiss and granodiorite. Typically, the surface layer is sandy loam.

The minor soils include Chewacla, Ashlar, Pacolet, Masada, Tate, and Rosman soils. Chewacla soils are on flood plains and are frequently flooded. They are somewhat poorly drained. Ashlar soils are on narrow side slopes and nose slopes and are moderately deep to hard bedrock. Pacolet and Masada soils are on ridgetops and side slopes and have a red, predominantly clayey subsoil. Pacolet soils are residual. Masada soils formed on ancient river terraces. Tate and Rosman soils are in areas where the mountains join the Piedmont. Tate soils are on colluvial benches and stream terraces. Rosman soils are on flood plains, commonly next to streams, and are well drained.

A hazard of erosion and the equipment limitation, which increase as slope increases, are the main management concerns affecting woodland production in areas of the Rion soils on slopes greater than 15 percent. No major management concerns affect woodland management in areas of the Wedowee soils.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. In addition, operating farm equipment is difficult and dangerous in steep areas of the Rion soils.

The slope is the main management concern affecting most urban uses in areas of this map unit that have slopes greater than 8 percent. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. The high content of clay and low strength in the subsoil are additional limitations affecting some urban uses in areas of the Wedowee soils.

9. Chandler-Watauga-Chestnut

Strongly sloping to very steep, somewhat excessively drained and well drained soils that have a loamy subsoil; on mountain uplands above an elevation of 2,500 feet

This map unit is located on the crest of the piedmont escarpment of the Blue Ridge Mountains, in the northwestern part of Wilkes County. The landscape is characterized by strongly sloping and moderately steep mountain ridgetops that are separated by steep and very steep mountain side slopes. Slopes range from 8 to 90 percent. Creeks and streams flow in winding courses through narrow depressions. Most of the soils in this unit are micaceous.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or along the contour of the side slopes.

This map unit makes up about 1 percent of Wilkes County. It is about 26 percent Chandler soils, 26 percent Watauga soils, 24 percent Chestnut soils, and 24 percent soils of minor extent.

The steep and very steep Chandler soils are commonly on dissected side slopes. These soils are very deep and somewhat excessively drained. They have a loamy subsoil and formed in residuum weathered predominantly from mica gneiss and mica schist. Typically, the surface layer is gravelly fine sandy loam.

The strongly sloping and moderately steep Watauga soils are on the smooth and wide parts of ridgetops and on the smooth and upper parts of side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in residuum weathered predominantly from mica gneiss and mica schist. Typically, the surface layer is loam.

The strongly sloping to very steep Chestnut soils are commonly on dissected side slopes. These soils are moderately deep to soft bedrock and are well drained. They have a loamy subsoil and formed in residuum weathered predominantly from mica gneiss and mica schist. Typically, the surface layer is gravelly sandy loam.

The minor soils include Ashe, Edneyville, and Tate soils. Ashe soils are on knobs and side slopes. They are moderately deep to hard bedrock. Edneyville soils are in the smoother areas on ridgetops and side slopes and are very deep. Tate soils are on colluvial stream terraces, on foot slopes, and in small drainageways.

The main management concerns affecting woodland production in areas of the Chandler, Watauga, and Chestnut soils on slopes greater than 15 percent are a hazard of erosion and the equipment limitation, which increase as slope increases. Because of the slope, the high content of mica in the Chandler and Watauga soils can cause high erodibility in unvegetated areas and instability in cut slopes. A windthrow hazard is an additional limitation in all areas of the Chestnut soils because of the moderate depth to bedrock.

The hazard of erosion, which increases as slope increases, is the main management concern affecting crops and pasture in this map unit. The Chandler and Watauga soils tend to erode and are severely subject to gullying because of the high content of mica. Operating farm equipment is difficult and dangerous in the steep and very steep areas. In addition, some areas have scattered stones on the surface.

The slope is the main management concern affecting urban uses in this map unit. As slope increases, surface runoff and the hazard of erosion increase in unvegetated areas. Because of the slope, the high content of mica in the Chandler and Watauga soils can cause high erodibility in unvegetated areas and instability in cut slopes. The moderate depth to bedrock in the Chestnut soils is a limitation affecting some urban uses. The scattered stones on the surface in some areas are an additional limitation affecting some urban uses.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. For example, the map unit Chestnut-Edneyville complex, 8 to 25 percent slopes, stony, would likely include small areas that have slopes of less than 8 percent or more than 25 percent and areas that have fewer or more stones than are required for the classification "stony." Generally, only those inclusions that are significant to use and management or that add to the user's understanding of the map unit concept are discussed.

Some included soils and miscellaneous areas have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Pacolet sandy clay loam, 8

to 15 percent slopes, eroded, is a phase of the Pacolet series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Evard-Cowee complex, 25 to 60 percent slopes, stony, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

BhC—Bethlehem-Hibriten complex, 6 to 15 percent slopes. This map unit consists of moderately deep, well drained Bethlehem and Hibriten soils on gently sloping to strongly sloping piedmont ridges and side slopes in the northeastern part of Wilkes County. The Bethlehem soil is on the broad parts of ridgetops. The Hibriten soil is in the more sloping areas. Commonly, both soils occur in the same landscape position. Individual areas are irregular in shape and range from about 5 to 80 acres in size. This unit is about 60 percent Bethlehem soil and 30 percent Hibriten soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Bethlehem soil are as follows—

Surface layer:
0 to 4 inches—dark yellowish brown gravelly sandy loam

Subsurface layer:
4 to 10 inches—yellowish brown gravelly sandy loam

Subsoil:
10 to 15 inches—yellowish brown sandy clay loam
15 to 30 inches—yellowish red clay

Bedrock:
30 to 60 inches—soft weathered sillimanite schist

The Bethlehem soil has moderate permeability. Surface runoff is moderate to rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 60 inches. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Hibriten soil are as follows—

Surface layer:
0 to 4 inches—dark yellowish brown very cobbly sandy loam

Subsurface layer:
4 to 12 inches—yellowish brown very cobbly sandy loam

Subsoil:
12 to 30 inches—reddish yellow very cobbly sandy clay loam

Bedrock:
30 to 60 inches—soft weathered sillimanite schist

The Hibriten soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included with this unit in mapping are small areas of Rion and Pacolet soils. These soils have fewer rock fragments than the Bethlehem and Hibriten soils. They are very deep and are on the smooth parts of ridgetops and side slopes. Rion soils have a loamy subsoil, and Pacolet soils have a predominantly clayey subsoil. Also included are some small areas that do not have soft weathered bedrock within a depth of 40 inches and some areas of rock outcrops. Contrasting inclusions make up about 10 percent of this map unit.

Most of this map unit is used as woodland. A small acreage is used as cropland or as pasture and hayland.

These Bethlehem and Hibriten soils are moderately suited to woodland. Overstory trees are chestnut oak, Virginia pine, black oak, white oak, scarlet oak, hickory, shortleaf pine, eastern white pine, and red maple. Understory vegetation includes sourwood, flowering dogwood, American holly, sassafras, red cedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry. The slope, the depth to bedrock, and rock fragments on the surface are the main limitations. The hazard of erosion and the equipment limitation are greater in the strongly sloping areas. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of

exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow, which particularly affects trees that have a taproot, such as pines. The rock fragments in the soils and the depth to bedrock limit the amount of water available for plant growth and increase seedling mortality rates.

These soils are poorly suited to cropland. The slope, droughtiness, the content and size of rock fragments, and the hazard of erosion are the main limitations.

These soils are moderately suited to pasture and hayland. The slope, the content and size of rock fragments, and droughtiness are the main limitations. The slope causes a hazard of erosion that affects the permanent establishment of vegetation. The rock fragments and the depth to bedrock can limit the amount of water available for plant growth. They can also hinder mowing operations.

These soils are poorly suited to most urban uses. The depth to bedrock, the content and size of rock fragments, and the slope are the main limitations. The depth to bedrock and the rock fragments affect the ease of digging, filling, and compacting the soils. Strongly sloping areas require more cutting and filling and more detailed site planning. The high content of clay and low strength in the subsoil of the Bethlehem soil are additional limitations. Where the soils are used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soils with sand and gravel and providing proper compaction increase the strength and stability of the soils for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Careful onsite examination is needed.

The capability subclass is IVe in areas of the Bethlehem soil and VIs in areas of the Hibriten soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3D in areas of both soils.

BrB2—Braddock clay loam, 2 to 8 percent slopes, eroded. This gently sloping, very deep, well drained soil is on high stream terraces and toe slopes along many of the streams and coves in the mountains. Individual areas are mainly somewhat elongated and range from about 4 to 20 acres in size.

Typically, the sequence, depth, and composition of the layers of this Braddock soil are as follows—

Surface layer:
0 to 6 inches—reddish brown clay loam

Subsoil:
6 to 22 inches—red clay loam
22 to 42 inches—dark red clay
42 to 60 inches—red clay loam

This soil has moderate permeability. Surface runoff is medium in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Tate, Evard, and Cowee soils. The loamy Tate soils are in low areas. Evard and Cowee soils formed in place. They are in the higher landscape positions at the base of the uplands. They have a loamy subsoil. Also included are soils that are rarely flooded in areas next to flood plains, soils that have gravelly strata at or below the surface, soils that have a red loamy subsoil, and small areas of soils similar to the Braddock soil. These similar soils include some slightly eroded Braddock soils that have a surface layer of loam in uncultivated areas and soils that have a brown subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as pasture and hayland or as cropland. A small acreage is used as woodland.

This Braddock soil is well suited to woodland. Overstory trees are scarlet oak, northern red oak, white oak, red maple, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. Depth to the predominantly clayey subsoil and the texture of the topsoil are the main limitations affecting woodland management. The depth to the predominantly clayey subsoil increases equipment limitations. The surface layer of clay loam increases seedling mortality rates.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. The surface layer of clay loam may be a limitation affecting the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The high content of clay, moderate shrink-swell potential, and low strength in the subsoil are the main limitations. Where the soil is used for septic tank absorption fields, the slower percolation rate of the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Designing roads, foundations, and footings that allow for the shrinking and swelling of the subsoil, diverting runoff away from buildings, and backfilling with material that has a low shrink-swell potential help to prevent structural damage. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

BrD2—Braddock clay loam, 8 to 25 percent slopes, eroded. This strongly sloping and moderately steep, very deep, well drained soil is on high stream terraces and toe slopes along many of the streams and coves in the mountains. Individual areas are mainly somewhat elongated and range from about 4 to 50 acres in size.

Typically, the sequence, depth, and composition of the layers of this Braddock soil are as follows—

Surface layer:

0 to 6 inches—reddish brown clay loam

Subsoil:

6 to 22 inches—red clay loam
22 to 42 inches—dark red clay
42 to 60 inches—red clay loam

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Tate, Evard, and Cowee soils. The loamy Tate soils are in low areas. Evard and Cowee soils formed in place. They are in the higher landscape positions at the base of the uplands. They have a loamy subsoil. Also included are some soils that have gravelly strata at or below the surface, soils that have a red loamy subsoil, and small areas of soils similar to the Braddock soil. These similar soils include some slightly eroded Braddock soils that have a surface layer of loam in uncultivated areas and soils that have a brown subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as pasture and hayland or as woodland.

This Braddock soil is moderately suited to woodland. Overstory trees are scarlet oak, northern red oak, white oak, red maple, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. The slope, depth to the predominantly clayey subsoil, and the texture of the topsoil are the main limitations affecting woodland management. The equipment limitation is greater on slopes of more than 15 percent, and erosion is a hazard in these areas. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. Depth to the predominantly clayey subsoil increases equipment limitations. The surface layer of clay loam increases seedling mortality rates.

In areas that have slopes of less than 15 percent, this soil is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are limitations. Areas that have slopes of more than 15 percent have a greater hazard of erosion, are poorly suited to most field crops, and need special consideration. The surface layer of clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is moderately suited to pasture and hayland. The surface layer of clay loam and the slope may adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

In areas that have slopes of less than 15 percent, this soil is moderately suited to most urban uses. The high content of clay, moderate shrink-swell potential, and low strength in the subsoil and the slope are the main limitations. Where the soil is used for the septic tank absorption fields, the slower percolation rate of the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Designing roads, foundations, and footings that allow for the shrinking and swelling of the subsoil, diverting runoff away from buildings, and backfilling with material that has a low shrink-swell potential help to prevent structural damage. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Areas that have slopes of more than 15 percent are poorly suited to urban uses and need special consideration because limitations in these areas are significantly higher.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 5R.

BuB—Buncombe loamy sand, 0 to 6 percent slopes, occasionally flooded. This nearly level and gently sloping, very deep, excessively drained soil is on piedmont flood plains adjacent to the larger streams in Wilkes County. Individual areas are mainly long and narrow and range from about 4 to 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Buncombe soil are as follows—

Surface layer:

0 to 8 inches—dark yellowish brown loamy sand

Underlying material:

8 to 18 inches—dark yellowish brown loamy sand

18 to 60 inches—very pale brown and yellowish brown sand

This soil has rapid permeability. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the underlying material is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. The soil is occasionally flooded for very brief periods. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Toccoa and Chewacla soils. These soils have loamy horizons extending to a depth of 40 inches or more. Toccoa soils are farther from stream channels than the Buncombe soil, commonly in the slightly lower landscape positions. Chewacla soils are somewhat poorly drained and are in depressions. Also included are a few borrow areas used for sand. Unless reshaped, the borrow areas consist of small pits or mounds. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland. A small acreage is used for cultivated crops or pasture.

This Buncombe soil is moderately suited to woodland. Overstory trees are American sycamore, green ash, red maple, yellow-poplar, black walnut, river birch, and black willow. Understory vegetation includes alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape. The texture of the surface layer is the main limitation. The sandy texture causes moderate equipment limitations. It also increases seedling mortality rates because the soil has a low moisture-holding capacity. Occasional flooding can limit planting or harvesting activities.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. Droughtiness, leaching of nutrients, and the occasional flooding are problems. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth. Split applications of fertilizer may offset the effects of leaching.

This soil is moderately suited to pasture and hayland. Droughtiness and the occasional flooding are problems. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The occasional flooding is a severe limitation. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along the Yadkin River. This flood-control structure reduces the frequency of flooding but does not eliminate the possibility of floods.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland symbol is 8S.

CdF—Chandler gravelly fine sandy loam, 25 to 80 percent slopes. This steep and very steep, very deep, somewhat excessively drained soil is on side slopes near the Blue Ridge escarpment in the mountains. Individual areas are irregular in shape and range from about 10 to 200 acres in size.

Typically, the sequence, depth, and composition of the layers of this Chandler soil are as follows—

Surface layer:

0 to 6 inches—dark brown gravelly fine sandy loam

Subsoil:

6 to 24 inches—dark yellowish brown sandy loam

Underlying material:

24 to 40 inches—light olive brown loamy sand

40 to 60 inches—multicolored loamy sand

This soil has moderately rapid permeability. Surface runoff is very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed. Areas on some side slopes have a hazard of slippage because of the high content of mica.

Included with this unit in mapping are small intermingled areas of Watauga, Chestnut, Ashe, and Edneyville soils. The finer textured Watauga soils are on benches and smooth side slopes and ridgetops. Chestnut, Ashe, and Edneyville soils have less mica than the Chandler soil. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches, and Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut and Ashe soils occur randomly throughout the map unit. Also included are areas of rock outcrops and a few areas that have stones on the surface. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Chandler soil is moderately suited to the production of trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, black gum, pitch pine, and eastern white pine. Understory plants include rhododendron, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, the equipment limitation and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is unsuited to most cultivated crops. The slope and the hazard of erosion are the main limitations.

This soil generally is poorly suited to pasture and hayland. The slope and the hazard of erosion are the main limitations. As slope increases, the equipment limitation increases. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition. Areas that have slopes of more than 50 percent are unsuited to pasture and hayland.

This soil generally is poorly suited to most urban uses because of the slope, the high content of mica, and the hazard of erosion. The hazard of slippage caused by the high content of mica increases as slope increases. The use of areas of this map unit for building site development should be carefully considered. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 11R.

CeD—Chestnut-Ashe complex, 8 to 25 percent slopes, very stony. This map unit consists of a moderately deep, well drained Chestnut soil and a moderately deep, somewhat excessively drained Ashe soil. These soils are on strongly sloping and moderately steep ridgetops in the mountains. The Chestnut soil is typically on the smooth and wide parts of ridgetops. The Ashe soil is typically on knobs and the narrow parts of ridgetops. In many areas both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 3 to 25 feet apart. Individual areas are long and narrow or irregularly shaped and range from about 5 to 200 acres or more in size. This unit is about 50 percent Chestnut soil and 35 percent Ashe soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Chestnut soil are as follows—

Surface layer:

0 to 2 inches—dark yellowish brown gravelly sandy loam

2 to 10 inches—yellowish brown gravelly sandy loam

Subsoil:

10 to 24 inches—yellowish brown sandy loam

Underlying material:

24 to 32 inches—yellowish brown sandy loam

Bedrock:

32 to 60 inches—soft weathered gneiss

The Chestnut soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Ashe soil are as follows—

Surface layer:
0 to 4 inches—olive brown gravelly sandy loam

Subsoil:
4 to 25 inches—light olive brown sandy loam

Underlying material:
25 to 35 inches—white loamy sand

Bedrock:
35 inches—hard unweathered granodiorite

The Ashe soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard unweathered bedrock ranges from 20 to 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Edneyville, Chandler, Cleveland, and Cowee soils. The very deep Edneyville soils are on the broad and smooth parts of ridgetops. The micaceous Chandler soils occur near the crests of the Blue Ridge Mountains, where the soil-forming rock is mica gneiss or mica schist. Chandler soils are very deep. The shallow Cleveland soils are on knobs. The finer textured Cowee soils occur randomly throughout the map unit. Also included are areas scattered throughout the map unit that are very bouldery or have rock outcrops and, mostly in the western and northwestern parts of the county, soils that have a high content of mica and that have soft weathered bedrock at a depth of 20 to 40 inches or 40 to 60 inches. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

These Chestnut and Ashe soils are moderately suited to the production of trees. Overstory trees include scarlet oak, black oak, northern red oak, chestnut oak, white oak, yellow-poplar, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, flowering dogwood, greenbrier, azalea, wild grape, and galax. The slope and the depth to bedrock are the main limitations. A hazard of erosion and equipment limitations are greater on the moderately steep slopes. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow. Droughtiness increases seedling mortality rates in areas of the Ashe soil.

These soils are poorly suited to cropland and to pasture and hayland because of the slope, the depth to bedrock, and rock fragments on the surface. The slope causes a severe hazard of erosion. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth. Because of the rock fragments on the surface, cultivation is impractical and mowing is difficult.

These soils are poorly suited to most urban uses. The slope, the depth to bedrock, and rock fragments on the surface are limitations.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil and 3R in areas of the Ashe soil.

CeF—Chestnut-Ashe complex, 25 to 90 percent slopes, very stony. This map unit consists of a moderately deep, well drained Chestnut soil and a moderately deep, somewhat excessively drained Ashe soil on steep and very steep ridgetops and side slopes in the mountains. The Chestnut soil is on the smooth and low parts of side slopes. The Ashe soil is on very narrow ridgetops, shoulder slopes, and bluffs adjacent to streams. In many areas both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 3 to 25 feet apart. Individual areas are long and narrow or irregularly shaped and range from about 5 to 1,000 acres or more in size. This unit is about 45 percent Chestnut soil and 35 percent Ashe soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Chestnut soil are as follows—

Surface layer:
0 to 2 inches—dark yellowish brown gravelly sandy loam
2 to 10 inches—yellowish brown gravelly sandy loam

Subsoil:
10 to 24 inches—yellowish brown sandy loam

Underlying material:
24 to 32 inches—yellowish brown sandy loam

Bedrock:
32 to 60 inches—soft weathered gneiss

The Chestnut soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is more than 40 inches. The high water table is below a depth of 6 feet. Soil reaction

ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Ashe soil are as follows—

Surface layer:

0 to 4 inches—olive brown gravelly sandy loam

Subsoil:

4 to 25 inches—light olive brown sandy loam

Underlying material:

25 to 35 inches—white loamy sand

Bedrock:

35 inches—hard unweathered granodiorite

The Ashe soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard unweathered bedrock ranges from 20 to 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Edneyville, Cleveland, Cullasaja, Greenlee, Ostin, Chandler, and Cowee soils. The very deep Edneyville soils are on the broad and smooth parts of ridgetops. The shallow Cleveland soils are on knobs. The colluvial Cullasaja, Greenlee, and Ostin soils are along drainageways, on benches, and on foot slopes. The micaceous Chandler soils occur near the crests of the Blue Ridge Mountains, where the soil-forming rock is mica gneiss or mica schist. They are very deep. The finer textured Cowee soils occur randomly throughout the map unit. Also included are areas scattered throughout the map unit that are very bouldery or have rock outcrops and, mostly in the western and northwestern parts of the county, soils that have a high content of mica and that have soft weathered bedrock at a depth of 20 to 40 inches or 40 to 60 inches. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

These Chestnut and Ashe soils are poorly suited to the production of trees. Overstory trees include scarlet oak, black oak, chestnut oak, white oak, pitch pine, Table Mountain pine, Virginia pine, eastern white pine, yellow-poplar, northern red oak, black locust, and black birch. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, Fraser magnolia, flowering dogwood, azalea, greenbrier, wild grape, and galax. The slope and the depth to bedrock are the main limitations. The hazard of erosion and equipment limitations are greater on the steep and very steep slopes. Extreme caution should be used when operating vehicles on these slopes. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Specialized logging practices, such as cable logging, can reduce the potential for erosion and eliminate the need for most skid trails and logging roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow. Droughtiness increases seedling mortality rates in areas of the Ashe soil.

These soils are unsuited to cropland and generally are poorly suited to pasture and hayland because of the slope, the depth to bedrock, and rock fragments on the surface. The slope causes a severe hazard of erosion. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth. Because of the rock fragments on the surface, cultivation is impractical and mowing is difficult. Areas that have slopes of more than 50 percent are unsuited to pasture and hayland.

These soils generally are poorly suited to most urban uses. The slope, the depth to bedrock, and rock fragments on the surface are limitations. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil and 3R in areas of the Ashe soil.

ChD—Chestnut-Edneyville complex, 8 to 25 percent slopes, stony. This map unit consists of a moderately deep, well drained Chestnut soil and a very deep, well drained Edneyville soil. These soils are on strongly sloping and moderately steep ridgetops in mountainous areas in the northern and western parts of Wilkes County. The Chestnut soil is on knobs and the narrow parts of ridgetops. The Edneyville soil is on the smooth and wide parts of ridgetops. Commonly, both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from about 5 to more than 300 acres in size. This unit is about 55 percent Chestnut soil and 30 percent Edneyville soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Chestnut soil are as follows—

Surface layer:

0 to 2 inches—dark yellowish brown gravelly sandy loam

2 to 10 inches—yellowish brown gravelly sandy loam

Subsoil:
10 to 24 inches—yellowish brown sandy loam

Underlying material:
24 to 32 inches—yellowish brown sandy loam

Bedrock:
32 to 60 inches—soft weathered gneiss

The Chestnut soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is more than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Edneyville soil are as follows—

Surface layer:
0 to 2 inches—very dark grayish brown gravelly sandy loam
2 to 5 inches—dark yellowish brown gravelly sandy loam

Subsoil:
5 to 27 inches—brown loam

Underlying material:
27 to 42 inches—yellowish brown sandy loam
42 to 60 inches—pale brown loamy sand

The Edneyville soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 60 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Ashe, Edneytown, Chandler, Evard, and Cowee soils. Ashe soils have hard unweathered rock at a depth of 20 to 40 inches. They are on knobs and at the end of ridges. Edneytown soils have a subsoil that is finer textured than that of the Chestnut and Edneyville soils. They are on flat, broad ridges. The micaceous Chandler soils occur near the crests of the Blue Ridge Mountains, where the soil-forming rock is mica gneiss or mica schist. They are very deep. The finer textured Evard and Cowee soils are at the lower elevations. Also included are scattered areas that are very stony or very bouldery and, in the western and northwestern parts of the county, soils that have a high content of mica and that have soft weathered bedrock at a depth of 20 to 40 inches or 40 to 60 inches. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

These Chestnut and Edneyville soils are moderately suited to the production of trees. Overstory trees include northern red oak, white oak, black oak, scarlet oak, yellow-poplar, black locust, chestnut oak, hickory, black birch, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, flowering dogwood, Fraser magnolia, blackgum, and galax. The slope is the main limitation affecting woodland management. The hazard of erosion and equipment limitations are greater on the moderately steep slopes. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Chestnut soil.

These soils are poorly suited to cropland because of the slope and rock fragments on the surface. The slope causes a severe hazard of erosion. Because of the rock fragments on the surface, cultivation is impractical. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth in areas of the Chestnut soil.

These soils are moderately suited to pasture and hayland. The slope and rock fragments on the surface can be limitations. The slope causes a severe hazard of erosion. Because of the rock fragments on the surface, mowing is difficult. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth in areas of the Chestnut soil.

These soils are poorly suited to most urban uses. The slope is the main limitation. The use of this map unit for building site development, such as summer homes, should be carefully considered. Most areas that have slopes of more than 15 percent require substantial cutting and filling. Areas of the Edneyville soil may be used for septic tank absorption fields if the fields are properly installed and designed. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock is an additional limitation in areas of the Chestnut soil.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil. Based on northern red oak as the indicator species, the woodland ordination symbol is 4R in areas of the Edneyville soil.

ChE—Chestnut-Edneyville complex, 25 to 60 percent slopes, stony. This map unit consists of a moderately deep, well drained Chestnut soil and a very deep, well drained Edneyville soil. These soils are on steep ridgetops in mountainous areas in the northern

and western parts of Wilkes County. The Chestnut soil is on narrow ridgetops, very steep shoulder slopes, and bluffs adjacent to streams. The Edneyville soil is on the smooth and low parts of side slopes. Commonly, both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from about 10 to more than 1,000 acres in size. This unit is about 60 percent Chestnut soil and 25 percent Edneyville soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Chestnut soil are as follows—

Surface layer:
- 0 to 2 inches—dark yellowish brown gravelly sandy loam
- 2 to 10 inches—yellowish brown gravelly sandy loam

Subsoil:
- 10 to 24 inches—yellowish brown sandy loam

Underlying material:
- 24 to 32 inches—yellowish brown sandy loam

Bedrock:
- 32 to 60 inches—soft weathered gneiss

The Chestnut soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is more than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Edneyville soil are as follows—

Surface layer:
- 0 to 2 inches—very dark grayish brown gravelly sandy loam
- 2 to 5 inches—dark yellowish brown gravelly sandy loam

Subsoil:
- 5 to 27 inches—brown loam

Underlying material:
- 27 to 42 inches—yellowish brown sandy loam
- 42 to 60 inches—pale brown loamy sand

The Edneyville soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Ashe, Chandler, Greenlee, Cullasaja, Ostin, Evard, and Cowee soils. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. They are on knobs and at the end of ridges. The micaceous Chandler soils occur near the crests of the Blue Ridge Mountains, where the soil-forming rock is mica gneiss or mica schist. They are very deep. The colluvial Greenlee and Cullasaja soils and the alluvial Ostin soils are along drainageways, on benches, and on foot slopes. The finer textured Evard and Cowee soils are at the lower elevations. Also included are scattered areas of very stony or very bouldery soils and, in the western and northwestern parts of the county, soils that have a high content of mica and have soft weathered bedrock at a depth of 20 to 40 inches or 40 to 60 inches. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

These Chestnut and Edneyville soils are moderately suited to the production of trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, black locust, black oak, chestnut oak, hickory, black birch, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, flowering dogwood, Fraser magnolia, blackgum, and galax. The slope is the main limitation affecting woodland management. It causes a severe hazard of erosion and severe equipment limitations. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Chestnut soil.

These soils are unsuited to cropland because of the slope and rock fragments on the surface. The slope causes a severe hazard of erosion. Because of the rock fragments on the surface, cultivation is impractical. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth in areas of the Chestnut soil.

These soils generally are poorly suited to pasture and hayland because of the slope and rock fragments on the surface. The slope causes a severe hazard of erosion. Because of the slope and rock fragments on the surface, mowing is difficult. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth in areas of the Chestnut

soil. Areas that have slopes of more than 50 percent are unsuited to pasture and hayland.

These soils generally are poorly suited to urban uses. The slope is the main limitation. The use of this map unit for building site development, such as summer homes, should be carefully considered. The soils require substantial cutting and filling. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock is an additional limitation in areas of the Chestnut soil. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil. Based on northern red oak as the indicator species, the woodland ordination symbol is 4R in areas of the Edneyville soil.

CkA—Chewacla loam, 0 to 2 percent slopes, frequently flooded. This nearly level, very deep, somewhat poorly drained soil is on flood plains on the Piedmont. Individual areas are mainly long and narrow and range from about 4 to 250 acres in size.

Typically, the sequence, depth, and composition of the layers of this Chewacla soil are as follows—

Surface layer:

0 to 2 inches—brown loam

2 to 8 inches—yellowish brown loam

Subsoil:

8 to 18 inches—light yellowish brown silty clay loam

18 to 30 inches—pale brown loam that has light brownish gray and brownish yellow mottles

30 to 38 inches—pale brown silt loam that has light brownish gray and brownish yellow mottles

38 to 50 inches—light brownish gray silt loam that has yellowish brown mottles

Underlying material:

50 to 60 inches—light brownish gray silt loam that has yellowish brown, brown, and brownish yellow mottles

This soil has moderate permeability. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 0.5 foot to 1.5 feet. The soil is frequently flooded for brief periods. Soil reaction ranges from very strongly acid to slightly acid to a depth of 40 inches. Below a depth of 40 inches, soil reaction ranges from very strongly acid to neutral.

Included in this unit in mapping are small areas of Buncombe, Toccoa, Wehadkee, Dogue, and State soils. The excessively drained, sandy Buncombe soils and the well drained Toccoa soils are adjacent to the deeper stream channels. Wehadkee soils are poorly drained and are in depressions. Dogue soils are moderately well drained and are in the slightly elevated areas on terraces. They have more clay in the subsoil than the Chewacla soil. State soils are well drained and are in the slightly elevated areas on terraces. Also included are soils that have less clay in the subsoil than the Chewacla soil and small areas of soils similar to the Chewacla soil. These similar soils have a thin layer of sandy overwash, have neutral soil reaction within a depth of 40 inches, have a layer of gravel within a depth of 40 inches in some areas, or are occasionally flooded. Contrasting inclusions make up about 25 percent of this map unit.

Most of the larger areas of this map unit are used as pasture and hayland or as cropland. Small areas are mainly used as woodland.

This Chewacla soil is moderately suited to woodland. Overstory trees are American sycamore, American beech, water oak, willow oak, green ash, red maple, yellow-poplar, river birch, black gum, and black willow. Understory vegetation includes alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape. The frequent flooding and wetness can be limitations affecting the use of equipment in planting or harvesting trees. These limitations may be overcome by operating equipment during dry periods. A moderate hazard of windthrow is an additional limitation.

This soil is poorly suited to most of the commonly grown field and truck crops because of the frequent flooding and wetness. However, areas that are drained and do not flood during the growing season are well suited to crops. Artificial subsurface drainage systems are needed to increase productivity. Surface drainage systems may also be needed. Most areas have a potential for crop damage or loss because of the flooding. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

This soil is moderately suited to pasture and hayland. Wetness and the frequent flooding are the main limitations. Artificial surface and subsurface drainage systems may be needed to improve productivity. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The frequent flooding and wetness are severe limitations. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along the Yadkin River. This flood-control structure reduces the frequency of flooding but

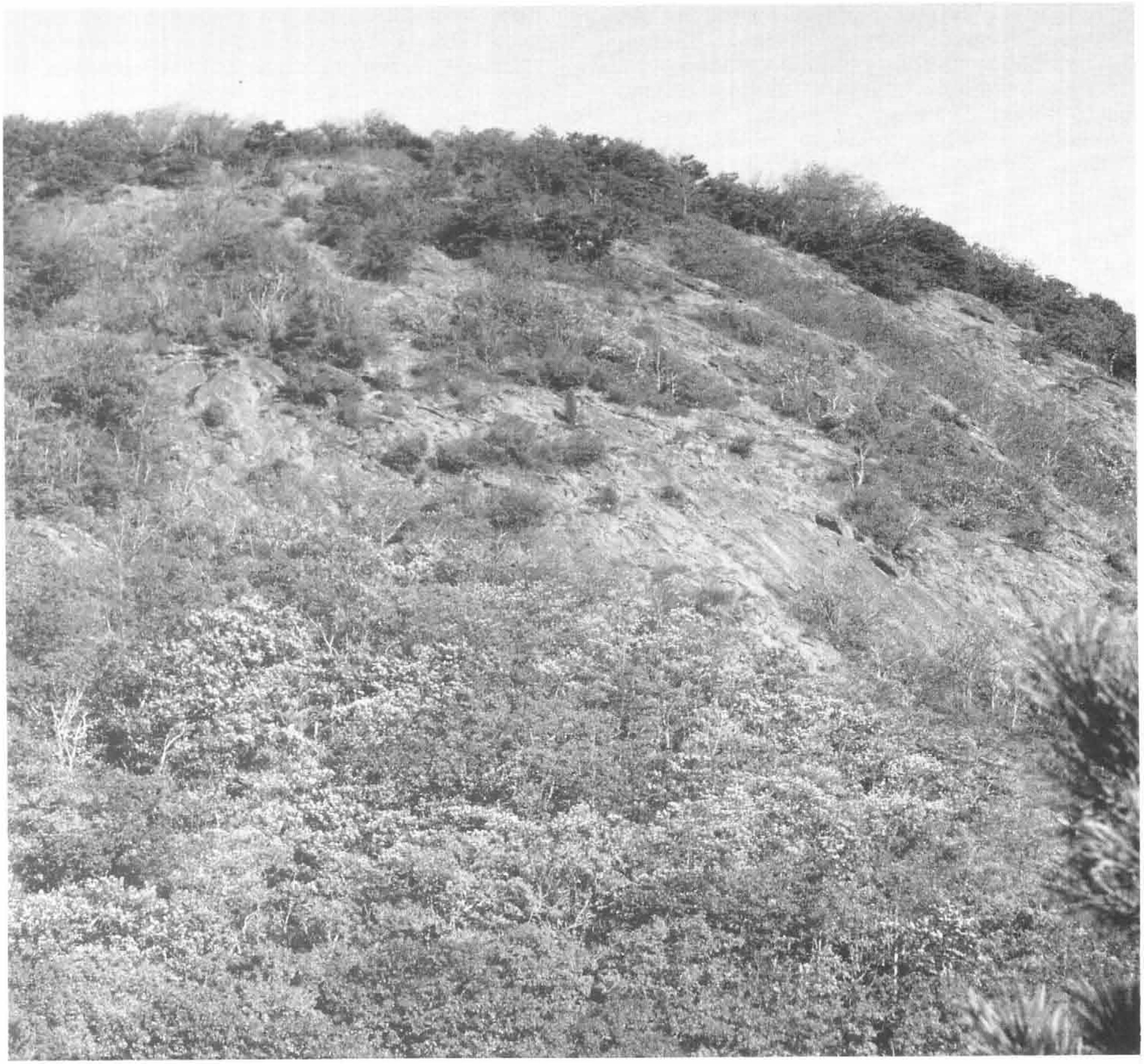

Figure 4.—An area of Cleveland-Rock outcrop complex, 8 to 90 percent slopes. This map unit has major limitations affecting all types of land use and is unsuited to commercial timber production.

does not eliminate the possibility of floods.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7W.

CrF—Cleveland-Rock outcrop complex, 8 to 90 percent slopes. This map unit consists of areas of a shallow, somewhat excessively drained Cleveland soil and areas of Rock outcrop (fig. 4). The map unit is on strongly sloping to very steep mountain side slopes and in a few areas along ridgetops. The Cleveland soil occurs in areas covered with trees and sparse vegetation. The Rock outcrop is scattered randomly throughout the map unit and generally occurs on the

steepest part of the landscape. Stones and boulders occur on the surface of the Cleveland soil. Individual areas are irregular in shape and range from about 5 to 250 acres in size. This unit is about 60 percent Cleveland soil and 25 percent Rock outcrop. The Cleveland soil and Rock outcrop occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Cleveland soil are as follows—

Surface layer:
0 to 4 inches—very dark grayish brown gravelly sandy loam

Subsoil:
4 to 14 inches—dark yellowish brown gravelly sandy loam

Bedrock:
14 inches—hard unweathered granitic gneiss

The Cleveland soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard unweathered bedrock ranges from 10 to 20 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid.

Included in this unit in mapping are small intermingled areas of Ashe and Chestnut soils. These soils are on smooth slopes in areas away from rock outcrops. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches, and Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Also included are soils that have bedrock within a depth of 10 inches and are adjacent to some rock outcrops. Contrasting inclusions make up about 15 percent of this map unit.

All of the acreage in this map unit supports low-grade hardwoods and pine.

This map unit is unsuited to the commercial production of trees. Overstory trees include scarlet oak, chestnut oak, eastern white pine, Table Mountain pine, blackjack oak, pitch pine, and Virginia pine. Understory plants include mountain laurel, blueberry, galax, arrowwood, red cedar, and sourwood. The slope, the depth to bedrock, rock outcrops, rock fragments on the surface, and poor access are the main limitations affecting woodland management. Operating any type of wheeled or tracked vehicle in this map unit is hazardous, and routes should be selected using extreme care. The depth to bedrock causes a severe hazard of windthrow in areas of the Cleveland soil. The hazard of erosion is severe. The droughty nature of the Cleveland soil increases seedling mortality rates.

This map unit is unsuited to cropland, pasture and hayland, and urban uses because of the slope, the depth to bedrock, stones on the surface, and rock outcrops.

The capability subclass is VIIe in areas of the Cleveland soil and VIIIs in areas of the Rock outcrop. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Cleveland soil. The Rock outcrop is not assigned a woodland ordination symbol.

CsD—Cowee-Saluda complex, 8 to 25 percent slopes, stony. This map unit consists of a moderately deep, well drained Cowee soil and a shallow, well drained Saluda soil on strongly sloping and moderately steep ridgetops in the mountains. The Cowee soil commonly is on the broad parts of ridgetops. The Saluda soil commonly is on knobs and the narrow parts of ridgetops. In many areas both soils occur in the same landscape position. Rock fragments on the surface of these soils range from boulders to cobbles, average 1 foot in diameter, and are 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from about 5 to 300 acres in size. This unit is about 70 percent Cowee soil and 15 percent Saluda soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Cowee soil are as follows—

Surface layer:
0 to 6 inches—dark brown gravelly sandy loam

Subsurface layer:
6 to 12 inches—strong brown gravelly sandy loam

Subsoil:
12 to 30 inches—red clay loam

Bedrock:
30 to 60 inches—soft weathered gneiss

The Cowee soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Saluda soil are as follows—

Surface layer:
0 to 6 inches—dark yellowish brown gravelly sandy loam

Subsoil:
6 to 18 inches—strong brown gravelly sandy clay loam

Bedrock:
18 to 40 inches—soft weathered sillimanite schist

The Saluda soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 10 to 20 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Evard, Chestnut, and Ashe soils. Evard soils do not have bedrock within a depth of 60 inches. They are on the broad parts of ridgetops. Ashe and Chestnut soils are on knobs and at the end of ridges. They have less clay in the subsoil than the Cowee and Saluda soils. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Soils in a few random areas may have a high content of mica in the lower part. These areas occur mostly in the western and northwestern parts of the county. Also included are scattered areas of soils that are very stony or very bouldery on the surface. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland. A very small acreage is used for orchards.

These Cowee and Saluda soils are moderately suited to the production of trees. Overstory trees include chestnut oak, northern red oak, scarlet oak, black oak, white oak, black locust, hickory, red maple, eastern white pine, Virginia pine, yellow-poplar, black gum, and pitch pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, lady fern, and greenbrier. The slope, the depth to bedrock, and droughtiness are the main limitations affecting woodland management on these soils. As slope increases, the hazard of erosion and equipment limitations increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Cowee soil and a severe hazard of windthrow in areas of the Saluda soil. Droughtiness increases seedling mortality rates.

These soils are poorly suited to most cultivated crops. The slope, the depth to bedrock, and rock fragments on the surface are the main limitations. The hazard of erosion is severe. The shallow root zone in the Saluda soil limits the amount of water available for plant growth. Because of the rock fragments on the surface, cultivation is difficult.

These soils are poorly suited to pasture and hayland. The slope and the rock fragments on the surface are the main limitations. The rock fragments adversely affect mowing operations and the establishment of sod. The shallow root zone in the Saluda soil limits the amount of water available for plant growth.

These soils are poorly suited to most urban uses because of the depth to bedrock, the slope, the hazard of erosion, and rock fragments at or near the surface.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Cowee soil and 2D in areas of the Saluda soil.

CsE—Cowee-Saluda complex, 25 to 60 percent slopes, stony. This map unit consists of a moderately deep, well drained Cowee soil and a shallow, well drained Saluda soil on steep side slopes in the mountains. The Cowee soil commonly is on the smooth and low parts of side slopes. The Saluda soil commonly is on shoulder slopes and nose slopes. In many areas both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are irregular in shape and range from about 15 to 500 acres in size. This unit is about 70 percent Cowee soil and 15 percent Saluda soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Cowee soil are as follows—

Surface layer:
0 to 6 inches—dark brown gravelly sandy loam

Subsurface layer:
6 to 12 inches—strong brown gravelly sandy loam

Subsoil:
12 to 30 inches—red clay loam

Bedrock:
30 to 60 inches—soft weathered gneiss

The Cowee soil has moderate permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a

depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid.

Typically, the sequence, depth, and composition of the layers of this Saluda soil are as follows—

Surface layer:

0 to 6 inches—dark yellowish brown gravelly sandy loam

Subsoil:

6 to 18 inches—strong brown gravelly sandy clay loam

Bedrock:

18 to 40 inches—soft weathered sillimanite schist

The Saluda soil has moderate permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 10 to 20 inches. The depth to hard unweathered bedrock is more than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid.

Included in this unit in mapping are small intermingled areas of Evard, Chestnut, and Ashe soils. Evard soils do not have bedrock within a depth of 60 inches. They are on the low parts of side slopes. Chestnut and Ashe soils are on shoulder slopes and nose slopes. They have less clay in the subsoil than the Cowee and Saluda soils. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Soils in a few random areas may have a high content of mica in the lower part. These areas occur mostly in the western and northwestern parts of the county. Also included are soils that have slopes of more than 60 percent and scattered areas of soils that are very stony or very bouldery on the surface. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

These Cowee and Saluda soils are poorly suited to the production of trees. Overstory trees include chestnut oak, northern red oak, scarlet oak, black oak, white oak, black locust, red maple, yellow-poplar, hickory, eastern white pine, Virginia pine, black gum, and pitch pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, lady fern, and greenbrier. The slope, the depth to bedrock, and droughtiness are the main limitations affecting woodland management. The hazard of erosion and equipment limitations are greater on the steep slopes. Extreme caution should be used when operating vehicles on these slopes. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Cowee soil and a severe hazard of windthrow in areas of the Saluda soil. Droughtiness increases seedling mortality rates.

These soils are unsuited to cropland. The slope and the rock fragments on the surface are the main limitations. The shallow root zone in the Saluda soil limits the amount of water available for plant growth.

These soils generally are poorly suited to pasture and hayland. The slope and the rock fragments on the surface are the main limitations. The rock fragments adversely affect mowing operations and the establishment of sod. The shallow root zone in the Saluda soil limits the amount of water available for plant growth. Areas that have slopes of more than 50 percent are unsuited to pasture and hayland.

These soils generally are poorly suited to most urban uses because of the depth to bedrock, the slope, the hazard of erosion, and rock fragments at or near the surface. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Cowee soil and 2R in areas of the Saluda soil.

CuE—Cullasaja very cobbly sandy loam, 15 to 60 percent slopes, extremely bouldery. This moderately steep and steep, very deep, well drained soil is in coves in the mountains. Individual areas are mainly long and narrow or irregular in shape and range from about 5 to 30 acres in size. Numerous rock fragments are on the surface. The rock fragments range from boulders to cobbles, average about 18 inches in diameter, and are about 0.5 foot to 18.0 feet apart (fig. 5).

Typically, the sequence, depth, and composition of the layers of this Cullasaja soil are as follows—

Surface layer:

0 to 10 inches—very dark brown very cobbly sandy loam

10 to 14 inches—dark brown very cobbly sandy loam

Subsoil:

14 to 38 inches—dark yellowish brown very cobbly loam

Underlying material:

38 to 60 inches—dark yellowish brown very cobbly loam

Figure 5.—An area of Cullasaja very cobbly sandy loam, 15 to 60 percent slopes, extremely bouldery. This soil has major limitations affecting many uses because of the many large rocks on the surface.

This soil has moderately rapid permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Chestnut, Ashe, and Ostin soils. Chestnut and Ashe soils formed in residuum. They occur on side slopes or

narrow remnants of mountain ridges on some of the larger fans. They have bedrock at a depth of 20 to 40 inches. Ostin soils are on flood plains and have gravelly or cobbly underlying material within a depth of 20 inches. Also included are soils that have less than 35 percent rock fragments, by volume, throughout and small areas of soils that are similar to the Greenlee soil but have a thinner or lighter-colored surface layer. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Cullasaja soil is poorly suited to woodland, but it has high productivity for timber. Overstory trees are yellow-poplar, white oak, scarlet oak, eastern hemlock, northern red oak, black cherry, black birch, yellow birch, black locust, and red maple. Understory vegetation includes rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, whitecap snakeroot, greenbrier, honeysuckle, blueberry, blackberry, poison ivy, sourwood, flowering dogwood, and wild grape. The slope, stones, and seedling mortality are the main limitations affecting woodland management. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are severe limitations. Areas on slopes of 15 to 35 percent have a moderate hazard of erosion. As slope increases, the hazard of erosion and equipment limitations increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. Stones on the surface cause a severe equipment limitation. Wheeled tractors and vehicles that have high ground clearance can be used in some areas if the routes are carefully selected. The rock fragments in the soil reduce the amount of moisture available to plants.

This soil is unsuited to most of the field and truck crops commonly grown in the county. The slope and the rock fragments on the surface are the main limitations. The slope causes a severe hazard of erosion. Because of the rock fragments, conventional tillage is impractical.

This soil generally is poorly suited or unsuited to pasture and hayland. The rock fragments on the surface and the slope are the main limitations. Even in areas having the least amount of boulders, the rock fragments hinder mowing operations and routes for vehicles need to be carefully selected. Because of the slope, mowing operations and the establishment of sod are difficult. In areas on slopes of less than 25 percent where rock fragments have been removed from the surface, the soil is moderately suited to pasture and hayland.

This soil generally is poorly suited to most urban uses. The slope and the large stones on the surface are the main limitations. Seepage from areas on the upper slopes can be a problem. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8R.

CwA—Cullowhee fine sandy loam, 0 to 3 percent slopes, frequently flooded. This nearly level, very deep, somewhat poorly drained soil is on flood plains of valleys in the mountains. Individual areas are mainly long and narrow and range from about 4 to 60 acres in size.

Typically, the sequence, depth, and composition of the layers of this Cullowhee soil are as follows—

Surface layer:

0 to 12 inches—dark brown fine sandy loam

Underlying material:

12 to 20 inches—brown fine sandy loam that has dark grayish brown, dark yellowish brown, and strong brown mottles

20 to 31 inches—dark grayish brown sandy loam that has dark brown mottles

31 to 60 inches—dark gray extremely gravelly sand that has dark brown mottles

This soil has moderately rapid permeability in the surface layer and rapid permeability in the underlying material. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 1.5 to 2.0 feet. The soil is frequently flooded for very brief periods. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Ostin, Reddies, and Tate soils. Ostin soils are well drained. They have more than 35 percent rock fragments, by volume, throughout. They are adjacent to stream channels where stream velocities are high. Reddies soils are in the slightly raised areas on flood plains and are moderately well drained. Tate soils are well drained and are on stream terraces and toe slopes. Also included are poorly drained soils in depressions. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland or as pasture and hayland.

This Cullowhee soil is moderately suited to woodland. Overstory trees are American sycamore, eastern hemlock, red maple, yellow-poplar, yellow birch, eastern white pine, Virginia pine, black locust, scarlet oak, black oak, and black willow. Understory vegetation includes alder, American hornbeam, black cherry,

greenbrier, honeysuckle, blackberry, switchcane, poison ivy, sourwood, flowering dogwood, rhododendron, mountain laurel, and wild grape. The frequent flooding and wetness are limitations affecting woodland management. The excessive amount of water during wet periods or during flooding increases seedling mortality rates and equipment limitations.

This soil is poorly suited to most of the commonly grown field and truck crops because of the frequent flooding and wetness. However, areas that are drained and do not flood during the growing season are well suited to crops. Artificial subsurface drainage systems are needed to increase productivity. Surface drainage systems may also be needed. Most areas have a potential for crop damage or loss because of the flooding. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

This soil is moderately suited to pasture and hayland. Wetness and the frequent flooding are the main limitations. Artificial surface and subsurface drainage systems may be needed to improve productivity. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The frequent flooding and wetness are severe limitations.

The capability subclass is IIIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8W.

DoB—Dogue fine sandy loam, 1 to 6 percent slopes, rarely flooded. This gently sloping, very deep, moderately well drained soil is on low stream terraces on the Piedmont. Individual areas are mainly somewhat elongated and range from about 4 to 40 acres in size.

Typically, the sequence, depth, and composition of the layers of this Dogue soil are as follows—

Surface layer:
0 to 2 inches—dark grayish brown fine sandy loam

Subsurface layer:
2 to 8 inches—brown fine sandy loam

Subsoil:
8 to 22 inches—brownish yellow clay loam
22 to 37 inches—brownish yellow clay that has red and light gray mottles
37 to 45 inches—light gray clay that has strong brown and brownish yellow mottles
45 to 52 inches—light gray clay loam that has brownish yellow mottles

Underlying material:
52 to 60 inches—light gray sandy clay loam

This soil has moderately slow permeability in the subsoil. Surface runoff is medium in bare and unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 1.5 to 3.0 feet. The soil is rarely flooded. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Masada, Chewacla, and State soils. Masada and State soils are well drained and are in the slightly elevated areas. Chewacla and State soils have less clay in the subsoil than the Dogue soil. Chewacla soils are somewhat poorly drained and are in depressions. Also included are poorly drained soils that have a predominantly clayey subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland.

This Dogue soil is well suited to woodland. Overstory trees are scarlet oak, white oak, red maple, yellow-poplar, shortleaf pine, southern red oak, American sycamore, eastern white pine, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland use and management.

This soil is well suited to most of the field and truck crops commonly grown in the county. Wetness, the slope, and a hazard of erosion can be problems. Eliminating surface depressions and managing surface water can improve productivity. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Wetness may be a problem during wet periods. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. Flooding, wetness, and the high content of clay, moderate shrink-swell potential, and low strength in the subsoil are the main limitations. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along

the Yadkin River. This flood-control structure reduces the frequency of flooding but does not eliminate the possibility of floods.

The capability subclass is IIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7A.

EdD—Edneytown gravelly sandy loam, 8 to 25 percent slopes. This strongly sloping and moderately steep, very deep, well drained soil is on ridgetops in the mountains. Individual areas are long and narrow or irregular in shape and range from about 5 to 40 acres in size.

Typically, the sequence, depth, and composition of the layers of this Edneytown soil are as follows—

Surface layer:
0 to 8 inches—pale brown gravelly sandy loam

Subsoil:
8 to 20 inches—yellowish brown sandy clay loam
20 to 39 inches—strong brown sandy clay loam

Underlying material:
39 to 54 inches—reddish yellow sandy loam
54 to 60 inches—white loamy sand

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid in the surface and subsurface layers unless the soil is limed and is very strongly acid or strongly acid in the subsoil and underlying material.

Included in this unit in mapping are small intermingled areas of Edneyville and Chestnut soils. These soils have a subsoil that is coarser than that of the Edneytown soil. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Also included are soils that have bedrock at a depth of 40 to 60 inches, soils that have a predominantly clayey subsoil, and some areas of rock outcrops. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

This Edneytown soil is moderately suited to the production of trees. Overstory trees include southern red oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, pitch pine, black gum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This soil is moderately suited to pasture and hayland. The slope is the main limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses because of the slope and the hazard of erosion. The use of this map unit for building site development should be carefully considered. Most areas that have slopes of more than 15 percent require substantial cutting and filling.

The capability subclass is VIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 10R.

ErC—Evard gravelly sandy loam, 6 to 15 percent slopes. This strongly sloping, very deep, well drained soil is on the broader ridgetops in the mountains. Individual areas are irregular in shape and range from about 5 to 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Evard soil are as follows—

Surface layer:
0 to 2 inches—dark yellowish brown gravelly sandy loam

Subsurface layer:
2 to 8 inches—yellowish brown gravelly sandy loam

Subsoil:
8 to 26 inches—red clay loam
26 to 36 inches—red sandy clay loam

Underlying material:
36 to 60 inches—strong brown sandy loam

This soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Hayesville and Cowee soils. Hayesville soils have a predominantly clayey subsoil. They are on the broad parts of ridgetops. Cowee soils have soft weathered bedrock at a depth of 20 to 40 inches. They are on knobs and at the end of ridges. Soils in a few random areas have a high content of mica in the lower part. Also included are scattered

areas of soils that have a stony surface, some soils that do not have a gravelly surface layer, and small areas of soils that are similar to the Evard soil but are eroded and have a surface layer of clay loam. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used for woodland or orchards. A small acreage is used as pasture and hayland or for row crops.

This Evard soil is well suited to the production of trees. Overstory trees include southern red oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, pitch pine, black gum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is moderately suited to most cultivated crops. The slope can be a limitation. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. The slope can be a limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses because of the slope and the hazard of erosion. The use of this map unit for building site development should be carefully considered.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7A.

ErD—Evard gravelly sandy loam, 15 to 25 percent slopes. This strongly sloping and moderately steep, very deep, well drained soil is on ridgetops in the mountains. Individual areas are long and narrow or irregular in shape and range from about 5 to 150 acres in size.

Typically, the sequence, depth, and composition of the layers of this Evard soil are as follows—

Surface layer:
0 to 2 inches—dark yellowish brown gravelly sandy loam

Subsurface layer:
2 to 8 inches—yellowish brown gravelly sandy loam

Subsoil:
8 to 26 inches—red clay loam
26 to 36 inches—red sandy clay loam

Underlying material:
36 to 60 inches—strong brown sandy loam

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Hayesville and Cowee soils. Hayesville soils have a predominantly clayey subsoil. They are on the broad parts of ridgetops. Cowee soils have soft weathered bedrock at a depth of 20 to 40 inches. They are on knobs and at the end of ridges. Soils in a few random areas may have a high content of mica in the lower part. Also included are scattered areas of soils that have a stony surface, some soils that do not have a gravelly surface layer, and small areas of soils that are similar to the Evard soil but are eroded and have a surface layer of clay loam. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland. A small acreage is used for orchards.

This Evard soil is moderately suited to the production of trees. Overstory trees include southern red oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, pitch pine, eastern white pine, black gum, and white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This soil is moderately suited to pasture and hayland. The slope is the main limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses because of the slope and the hazard of erosion. The use of this map unit for building site development should be

carefully considered. Most areas that have slopes of more than 15 percent require substantial cutting and filling.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R.

EsD—Evard-Cowee complex, 8 to 25 percent slopes, stony. This map unit consists of a very deep, well drained Evard soil and a moderately deep, well drained Cowee soil on strongly sloping and moderately steep ridgetops in the mountains. The Evard soil is typically on the smooth and wide parts of ridgetops. The Cowee soil is typically on knobs and the narrow parts of ridgetops. In many areas both soils occur in the same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from about 5 to 100 acres in size. This unit is about 65 percent Evard soil and 20 percent Cowee soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Evard soil are as follows—

Surface layer:
0 to 2 inches—dark yellowish brown gravelly sandy loam

Subsurface layer:
2 to 8 inches—yellowish brown gravelly sandy loam

Subsoil:
8 to 26 inches—red clay loam
26 to 36 inches—red sandy clay loam

Underlying material:
36 to 60 inches—strong brown sandy loam

The Evard soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Cowee soil are as follows—

Surface layer:
0 to 6 inches—dark brown gravelly sandy loam

Subsurface layer:
6 to 12 inches—strong brown gravelly sandy loam

Subsoil:
12 to 30 inches—red clay loam

Bedrock:
30 to 60 inches—soft weathered gneiss

The Cowee soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Hayesville and Saluda soils. Hayesville soils have a predominantly clayey subsoil. They are on the broad parts of ridgetops. Saluda soils have soft weathered bedrock within a depth of 20 inches. They are on knobs and at the end of ridges. Soils in a few random areas may have a high content of mica in the lower part. These areas occur mostly in the western and northwestern parts of the county. Also included are scattered areas of soils that have a very stony or very bouldery surface. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland. A small acreage is used for orchards.

These Evard and Cowee soils are moderately suited to the production of trees. Overstory trees include southern red oak, white oak, scarlet oak, black oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, pitch pine, black gum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Cowee soil.

These soils are poorly suited to most cultivated crops. The slope and the rock fragments on the surface are the main limitations. The hazard of erosion is severe. Because of the rock fragments, cultivation is difficult. Orchards should be planted on the contour. Establishing a grass cover around the trees helps to control erosion. The rock fragments hinder mowing operations.

These soils are moderately suited to pasture and hayland. The slope and the rock fragments on the surface are the main limitations. The rock fragments

adversely affect mowing operations and the establishment of sod.

These soils are poorly suited to most urban uses because of the slope, the hazard of erosion, and the rock fragments at or near the surface. The depth to bedrock is an additional limitation in areas of the Cowee soil. The use of this map unit for building site development should be carefully considered. Most areas that have slopes of more than 15 percent require substantial cutting and filling. Areas of the Evard soil that have slopes of less than 15 percent may be used for septic tank absorption fields if the fields are properly installed and designed.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R in areas of the Evard soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Cowee soil.

EsE—Evard-Cowee complex, 25 to 60 percent slopes, stony. This map unit consists of a very deep, well drained Evard soil and a moderately deep, well drained Cowee soil on steep side slopes in the mountains. The Evard soil is typically on the smooth and low parts of side slopes. The Cowee soil is typically on shoulder slopes and nose slopes. In many areas both soils occur in the same landscape position. Rock fragments on the surface of these soils range from boulders to cobbles, average 1 foot in diameter, and are 25 to 80 feet apart. Individual areas are irregular in shape and range from about 10 to more than 500 acres in size. This unit is about 65 percent Evard soil and 20 percent Cowee soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Evard soil are as follows—

Surface layer:
0 to 2 inches—dark yellowish brown gravelly sandy loam

Subsurface layer:
2 to 8 inches—yellowish brown gravelly sandy loam

Subsoil:
8 to 26 inches—red clay loam
26 to 36 inches—red sandy clay loam

Underlying material:
36 to 60 inches—strong brown sandy loam

The Evard soil has moderate permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Cowee soil are as follows—

Surface layer:
0 to 6 inches—dark brown gravelly sandy loam

Subsurface layer:
6 to 12 inches—strong brown gravelly sandy loam

Subsoil:
12 to 30 inches—red clay loam

Bedrock:
30 to 60 inches—soft weathered gneiss

The Cowee soil has moderate permeability. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Tate, Saluda, and Chestnut soils. Tate soils formed from colluvium and are along drainageways and on benches. They are brown. Saluda soils have soft weathered bedrock within a depth of 10 to 20 inches. They are on shoulder slopes and nose slopes. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches and have less clay in the subsoil than the Evard and Cowee soils. Soils in a few random areas have a high content of mica in the lower part. These areas occur mostly in the western and northwestern parts of the county. Also included are scattered areas of soils that have a very stony or very bouldery surface. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland. A small acreage is used for orchards.

These Evard and Cowee soils are moderately suited to woodland. Overstory trees include southern red oak, black oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, pitch pine, black gum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. The hazard of erosion and equipment limitations are greater on the steep slopes. Extreme caution should be used when operating vehicles on these slopes. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be installed on the contour. Water bars help to control the

flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow in areas of the Cowee soil.

These soils are unsuited to most cultivated crops. The slope and the rock fragments on the surface are the main limitations. Orchards should be planted on the contour. Establishing a grass cover around the trees helps to control erosion. The rock fragments hinder mowing operations.

These soils generally are poorly suited to pasture and hayland. The slope and the rock fragments on the surface are the main limitations. Areas that have slopes of more than 50 percent are unsuited to pasture and hayland.

These soils generally are poorly suited to most urban uses because of the slope, the hazard of erosion, and rock fragments at or near the surface. The depth to bedrock is an additional limitation in areas of the Cowee soil. Building sites typically require substantial cutting and filling and thus careful design. Areas that have slopes of more than 50 percent are unsuited to urban uses.

The capability subclass is VIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R in areas of the Evard soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Cowee soil.

GrD—Greenlee-Ostin complex, 3 to 40 percent slopes, very stony. This map unit consists of very deep, well drained Greenlee and Ostin soils in gently sloping to steep areas in mountain coves and valleys. The strongly sloping to steep Greenlee soil is on foot slopes in areas that have many large rocks on the surface. The gently sloping Ostin soil is on narrow flood plains. Rock fragments on the surface of the Greenlee soil range from boulders to cobbles, average 20 inches in diameter, and are about 3 to 25 feet apart. Individual areas are mainly long and narrow or irregular in shape and range from about 5 to 200 acres in size. This unit is about 55 percent Greenlee soil and 25 percent Ostin soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Greenlee soil are as follows—

Surface layer:

0 to 4 inches—dark brown very cobbly sandy loam
4 to 8 inches—brown very cobbly sandy loam

Subsoil:

8 to 40 inches—yellowish brown very cobbly sandy loam

Underlying material:

40 to 60 inches—yellowish brown very cobbly sandy loam

The Greenlee soil has moderately rapid permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Ostin soil are as follows—

Surface layer:

0 to 4 inches—dark brown very cobbly loamy sand

Underlying material:

4 to 60 inches—dark yellowish brown very cobbly loamy sand

The Ostin soil has rapid permeability. Surface runoff is slow or medium in bare and unprotected areas. The shrink-swell potential of the underlying material is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 2.5 to 3.5 feet. The soil is occasionally flooded for very brief periods. Soil reaction ranges from very strongly acid to neutral.

Included in this unit in mapping are small intermingled areas of Tate, Chestnut, and Ashe soils. Tate soils have a subsoil that is finer textured than that of the Greenlee and Ostin soils. They are on foot slopes. Chestnut and Ashe soils formed from residuum and are adjacent to the Greenlee and Ostin soils on side slopes. Also included are some soils that have less than 35 percent rock fragments, by volume, at a depth of 10 to 40 inches and small areas of Cullasaja soils that are similar to the Greenlee soil but have a thick, dark surface layer. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

These Greenlee and Ostin soils are moderately suited to woodland. Overstory trees are yellow-poplar, black cherry, eastern hemlock, white oak, black birch, river birch, American sycamore, northern red oak, scarlet oak, red maple, black locust, Virginia pine, eastern white pine, and pitch pine. Understory vegetation includes rhododendron, mountain laurel, Fraser magnolia, New York fern, Christmas fern, galax, whitecap snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. The slope is the main limitation affecting woodland management on the Greenlee soil. As slope increases, the hazard of erosion and equipment limitations increase. Logging roads and skid trails should be installed on the contour. Water

bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The rock fragments on the surface of the Greenlee soil are an additional limitation. Wheeled tractors and vehicles that have high ground clearance can be used if the routes are carefully selected. The large amount of rock fragments in both soils limits the soil water-holding capacity, and tree growth may be poor during dry periods. Seedling mortality is moderate in areas of both soils. Flooding can limit planting or harvesting activities on the Ostin soil. Logging operations should be restricted to dry periods.

These soils are unsuited to most of the field and truck crops commonly grown in the county. The slope and the rock fragments on the surface are the main limitations in areas of the Greenlee soil. The slope causes a severe hazard of erosion. Because of the rock fragments, conventional tillage is impractical. Droughtiness, the rock fragments in the soil, and the occasional flooding are limitations in areas of the Ostin soil.

These soils are poorly suited to pasture and hayland. The slope and the rock fragments on the surface are the main limitations in areas of the Greenlee soil. The rock fragments hinder mowing operations, and routes for vehicles need to be carefully selected. Droughtiness, the rock fragments in the soil, and the occasional flooding are limitations in areas of the Ostin soil.

The Greenlee soil is poorly suited to most urban uses because of the slope and the content of large stones. The Ostin soil is unsuited to these uses because of the flooding.

The capability subclass is VIIs in areas of the Greenlee soil and VIs in areas of the Ostin soil. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8X in areas of the Greenlee soil and 8F in areas of the Ostin soil.

HaC2—Hayesville sandy clay loam, 6 to 15 percent slopes, eroded. This strongly sloping, very deep, well drained soil is on the broader ridgetops in low mountainous areas of Wilkes County. Individual areas are mainly somewhat elongated or irregular in shape and range from about 4 to 60 acres in size.

Typically, the sequence, depth, and composition of the layers of this Hayesville soil are as follows—

Surface layer:
0 to 8 inches—strong brown sandy clay loam

Subsoil:
8 to 40 inches—red clay
40 to 58 inches—red clay loam

Underlying material:
58 to 60 inches—red loam

This soil has moderate permeability in the subsoil. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Evard and Cowee soils. Evard soils have a loamy subsoil. They are on knobs and in the more sloping areas. Cowee soils have a loamy subsoil and have soft weathered bedrock at a depth of 20 to 40 inches. They are on narrow ridgetops, side slopes, and knobs. Some scattered areas have stones on the surface. Also included are small areas of some slightly eroded Hayesville soils that have a surface layer of sandy loam and have not been cultivated. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used for woodland or orchards. A small acreage is used as pasture and hayland or for row crops.

This Hayesville soil is well suited to woodland. Virginia pine and pitch pine are the dominant overstory trees in areas where former fields have reverted to woodland. Other overstory trees may include scarlet oak, chestnut oak, white oak, northern red oak, red maple, eastern white pine, yellow-poplar, and hickory. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, sassafras, mountain laurel, and wild grape. Depth to the predominantly clayey subsoil and the texture of the surface layer are the main limitations affecting woodland. Depth to the predominantly clayey subsoil causes a moderate equipment limitation. Logging operations should be restricted to dry periods. The surface layer of sandy clay loam increases seedling mortality rates.

This soil is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of sandy clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management,

grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Depth to the predominantly clayey subsoil and the texture of the surface layer may adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The slope and the high content of clay and low strength in the subsoil are the main limitations. Strongly sloping areas require extensive cutting and filling and more detailed site planning. Where the soil is used for septic tank absorption fields, the slower percolation rate of the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

HbE—Hibriten very cobbly sandy loam, 15 to 45 percent slopes. This moderately steep and steep, moderately deep, well drained soil is on piedmont side slopes, mostly in the northeastern part of Wilkes County. Individual areas are irregular in shape and range from about 4 to 200 acres in size.

Typically, the sequence, depth, and composition of the layers of this Hibriten soil are as follows—

Surface layer:
0 to 4 inches—dark yellowish brown very cobbly sandy loam

Subsurface layer:
4 to 12 inches—yellowish brown very cobbly sandy loam

Subsoil:
12 to 30 inches—reddish yellow very cobbly sandy clay loam

Bedrock:
30 to 60 inches—soft weathered sillimanite schist

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Rion and Chewacla soils. Rion soils have fewer rock fragments than the Hibriten soil. They are very deep and are on the smooth parts of side slopes. Chewacla soils are somewhat poorly drained and are on small flood plains and in drainageways. Also included are some rock outcrops and small areas of soils that are similar to the Hibriten soil but that have ledges of hard unweathered bedrock within a depth of 40 inches. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Hibriten soil is moderately suited to woodland. Overstory trees are white oak, chestnut oak, pitch pine, Virginia pine, black oak, scarlet oak, hickory, shortleaf pine, eastern white pine, and red maple. Understory vegetation includes sourwood, flowering dogwood, American holly, sassafras, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope, the depth to bedrock, and the rock fragments on the surface are the main limitations. The hazard of erosion and equipment limitations are greater on the steep slopes. Extreme caution should be used when operating vehicles on slopes greater than 25 percent. On slopes greater than 25 percent, extensive grading is needed to establish roads and trails. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock causes a moderate hazard of windthrow, which particularly affects trees having a taproot, such as pines. The rock fragments in the soil and the depth to bedrock limit the amount of water available for plant growth and increase seedling mortality rates.

This soil is unsuited to cropland. The slope, droughtiness, the content and size of rock fragments, and the hazard of erosion are the main limitations.

This soil is poorly suited to pasture and hayland. The slope, the content and size of rock fragments, and droughtiness are the main limitations. The slope causes a hazard of erosion and equipment limitations. The rock fragments and the depth to bedrock may limit the amount of water available for plant growth.

This soil is poorly suited to most urban uses. The depth to bedrock, the content and size of rock fragments, and the slope are the main limitations. The depth to bedrock and the rock fragments affect the ease of digging, filling, and compacting the soil. Careful onsite examination is needed. Areas on steep slopes require more cutting and filling and more detailed site planning.

The capability subclass is VIIs. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R.

MaB2—Masada sandy clay loam, 2 to 8 percent slopes, eroded. This gently sloping, very deep, well drained soil is on high stream terraces along many of the larger streams of the Piedmont. Individual areas are mainly somewhat elongated and range from about 4 to 150 acres in size.

Typically, the sequence, depth, and composition of the layers of this Masada soil are as follows—

Surface layer:
0 to 8 inches—dark yellowish brown sandy clay loam

Subsoil:
8 to 18 inches—strong brown clay
18 to 42 inches—red clay
42 to 58 inches—yellowish red sandy clay loam

Underlying material:
58 to 60 inches—yellowish red sandy clay loam

This soil has moderate permeability. Surface runoff is medium in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Dogue, State, and Pacolet soils. The moderately well drained Dogue soils are in depressions and along small drainageways that cross the map unit. State soils have a loamy subsoil. They are in the lower areas. Pacolet soils are underlain by saprolite and have a low shrink-swell potential. They are on upland knolls. Also included are small areas of soils similar to the Hibriten soil. These similar soils include the slightly eroded Masada soils that have a surface layer of sandy loam, soils that have a dark red subsoil, and soils containing pebbles or cobbles in the surface layer. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as pasture and hayland or as cropland.

This Masada soil is well suited to woodland. Overstory trees are scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. Depth to the predominantly clayey subsoil and the texture of the surface layer are the main limitations. Depth to the predominantly clayey subsoil increases equipment limitations. The surface layer of sandy clay loam increases seedling mortality rates.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are the main limitations. The surface layer of sandy clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Depth to the predominantly clayey subsoil and the texture of the surface layer can adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The high content of clay, moderate shrink-swell potential, and low strength in the subsoil are the main limitations. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Designing roads, foundations, and footings that allow for the shrinking and swelling of the subsoil, diverting runoff away from buildings, and backfilling with material that has a low shrink-swell potential help to prevent structural damage. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 10C.

MaC2—Masada sandy clay loam, 8 to 15 percent slopes, eroded. This strongly sloping, very deep, well drained soil is on high stream terraces on the Piedmont. Individual areas are mainly somewhat elongated and range from about 4 to 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Masada soil are as follows—

Surface layer:
0 to 8 inches—dark yellowish brown sandy clay loam

Subsoil:
8 to 18 inches—strong brown clay
18 to 42 inches—red clay
42 to 58 inches—yellowish red sandy clay loam

Underlying material:
58 to 60 inches—yellowish red sandy clay loam

This soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Pacolet and Rion soils. Pacolet soils are underlain by saprolite and have a low shrink-swell potential. They are on upland knolls. Rion soils are residual soils that have a loamy subsoil. They occur on slopes adjacent to the flood plain. Also included are small areas of soils similar to the Masada soil. These similar soils include the slightly eroded Masada soils that have a surface layer of sandy loam, soils that have a dark red subsoil, and soils containing pebbles or cobbles in the surface layer. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as pasture and hayland or as cropland.

This Masada soil is well suited to woodland. Overstory trees are scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. Depth to the predominantly clayey subsoil and the texture of the surface layer are the main limitations. Depth to the predominantly clayey subsoil increases equipment limitations. The surface layer of sandy clay loam increases seedling mortality rates.

This soil is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are the main limitations. The surface layer of sandy clay loam may form clods if the soil is tilled it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. The slope, depth to the predominantly clayey subsoil, and the texture of the surface layer can adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The slope and the high content of clay, moderate shrink-swell potential, and low strength in the subsoil are the main limitations. Strongly sloping areas require more cutting and filling and more detailed site planning. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Designing roads, foundations, and footings that allow for the shrinking and swelling of the subsoil, diverting runoff away from buildings, and backfilling with material that has a low shrink-swell potential help to prevent structural damage. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 10C.

MsB2—Masada gravelly sandy clay loam, 2 to 8 percent slopes, eroded. This gently sloping, very deep, well drained soil is on high stream terraces on the Piedmont, mainly in the northeastern part of Wilkes County. This soil has quartz gravel and cobbles remaining from an alluvial cap. Individual areas are irregular in shape and range from about 4 to 350 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Masada soil are as follows—

Surface layer:
0 to 8 inches—dark yellowish brown gravelly sandy clay loam

Subsoil:
8 to 18 inches—strong brown clay
18 to 42 inches—red clay
42 to 58 inches—yellowish red sandy clay loam

Underlying material:
58 to 60 inches—yellowish red sandy clay loam

This soil has moderate permeability. Surface runoff is medium in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Pacolet, Wedowee, and Rion soils. These soils are underlain by saprolite and have a low shrink-swell potential in the subsoil. They are on scattered upland knolls and have stream deposits of gravel and cobbles in the surface layer. Wedowee soils have a yellow to brown, predominantly clayey subsoil. Pacolet soils have a red, predominantly clayey subsoil. Rion soils have a loamy subsoil. Also included are small areas of soils similar to the Masada soil. These similar soils include the slightly eroded Masada soils that have a surface layer of gravelly sandy loam, sandy clay loam, or cobbly sandy clay loam and soils that have a dark red subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland.

This Masada soil is well suited to woodland. Overstory trees are scarlet oak, white oak, loblolly pine, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. Depth to the predominantly clayey subsoil is the main limitation. It increases equipment limitations. In addition, the topsoil of gravelly sandy clay loam increases seedling mortality rates.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of gravelly sandy clay loam may form clods if the soil is tilled when it is too wet. Large amounts of gravel in the surface layer can hinder field operations. Cobbles need to be removed where operating machinery is too difficult. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Depth to the predominantly clayey subsoil and the texture of the surface layer can adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The high content of clay and low strength in the subsoil are the main limitations. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8C.

MsC2—Masada gravelly sandy clay loam, 8 to 15 percent slopes, eroded. This strongly sloping, very deep, well drained soil is on high stream terraces on the Piedmont, mainly in the northeastern part of Wilkes County. This soil has quartz gravel and cobbles remaining from an alluvial cap. Individual areas are irregular in shape and range from about 4 to 40 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Masada soil are as follows—

Surface layer:

0 to 8 inches—dark yellowish brown gravelly sandy clay loam

Subsoil:

8 to 18 inches—strong brown clay

18 to 42 inches—red clay

42 to 58 inches—yellowish red sandy clay loam

Underlying material:

58 to 60 inches—yellowish red sandy clay loam

This soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Pacolet, Wedowee, and Rion soils. These soils are underlain by saprolite and have a low shrink-swell potential. They are on scattered upland knolls and have stream deposits of gravel and cobbles in the surface layer. Wedowee soils have a yellow to brown, predominantly clayey subsoil. Pacolet soils have a red, predominantly clayey subsoil. Rion soils have a loamy subsoil. Also included are small areas of soils similar to the Masada soil. These similar soils include the slightly eroded Masada soils that have a surface layer of gravelly sandy loam, sandy clay loam, or cobbly sandy clay loam and soils that have a dark red subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland.

This Masada soil is well suited to woodland. Overstory trees are scarlet oak, white oak, loblolly pine, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. Depth to the predominantly clayey subsoil and the slope are the main limitations. Depth to the predominantly clayey subsoil increases equipment limitations. Logging roads should be installed on the contour. The topsoil of gravelly sandy clay loam increases seedling mortality rates.

This soil is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of gravelly sandy clay loam may form clods if the soil is tilled when it is too wet. Large amounts of gravel in the surface layer can hinder field operations. Cobbles need to be removed where operating machinery is too difficult. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Depth to the predominantly clayey subsoil, the texture of the surface layer, and the slope can adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The slope and the high content of clay and low strength in the subsoil are the main limitations. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8C.

MuC—Masada-Urban land complex, 2 to 15 percent slopes. This map unit consists of areas of a very deep, well drained Masada soil and areas of Urban land on gently sloping to strongly sloping high stream terraces in and around small towns and housing developments on the Piedmont. The Masada soil occurs as undisturbed areas between buildings, roads, streets, and parking lots. Individual areas are generally rectangular in shape and range from about 5 to 20 acres in size. This unit is about 50 percent Masada soil and 30 percent Urban land. The Masada soil and Urban land are so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Masada soil are as follows—

Surface layer:

0 to 8 inches—dark yellowish brown sandy clay loam

Subsoil:

8 to 18 inches—strong brown clay
18 to 42 inches—red clay
42 to 58 inches—yellowish red sandy clay loam

Underlying material:

58 to 60 inches—yellowish red sandy clay loam

The Masada soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included in this unit in mapping are small areas of Udorthents and Dogue, State, and Pacolet soils. Udorthents consist of areas of cut and fill. They are adjacent to the impervious surfaces of Urban land. The moderately well drained Dogue soils are in depressions

and along small drainageways that cross the map unit. State soils have a loamy subsoil. They are in the lower areas. Pacolet soils have a low shrink-swell potential in the subsoil and are underlain by saprolite. They are on upland knolls. Also included are small areas of soils similar to the Masada soil. These similar soils include the slightly eroded Masada soils that have a surface layer of sandy loam and soils that have a dark red subsoil. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as urban land or for yards, gardens, recreational areas, and landscaping on and around urban land. Areas of the Masada soil are too small for commercial woodland production, cropland, or pasture and hayland.

This map unit is moderately suited to most urban uses. The slope and the high content of clay and low strength in the subsoil are the main limitations. Areas on slopes of more than 8 percent require more cutting and filling and more detailed site planning. Where the unit is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Undisturbed areas of the Masada soil are moderately suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. However, areas that have been cut, filled, or compacted may be poorly suited. Onsite investigation is needed to determine limitations for this map unit because the open areas are small.

The capability subclass is IVe in areas of the Masada soil and VIIIs in areas of the Urban land. This map unit is not assigned a woodland ordination symbol.

OsB—Ostin very cobbly loamy sand, 1 to 5 percent slopes, occasionally flooded. This gently sloping, very deep, well drained soil is on flood plains in the mountains. Individual areas mainly range from about 5 to 80 acres in size.

Typically, the sequence, depth, and composition of the layers of this Ostin soil are as follows—

Surface layer:

0 to 4 inches—dark brown very cobbly loamy sand

Underlying material:

4 to 60 inches—dark yellowish brown very cobbly loamy sand

This soil has rapid permeability. Surface runoff is slow or medium in bare and unprotected areas. The shrink-swell potential of the underlying material is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 2.5 to 3.5 feet. The soil is occasionally flooded for very brief periods. Soil reaction ranges from very strongly acid to neutral.

Included in this unit in mapping are small intermingled areas of Reddies, Rosman, Cullowhee, and Greenlee soils. Reddies, Rosman, and Cullowhee soils have less than 35 percent rock fragments, by volume, within a depth of 20 inches. Reddies and Rosman soils are in the slightly higher landscape positions on flood plains. Cullowhee soils are somewhat poorly drained and are in depressions. Greenlee soils contain stones, boulders, and cobbles throughout. They are strongly sloping and moderately steep. Also included are soils that have sandy strata to a depth of 40 inches and do not contain a large amount of rock fragments. These soils occur randomly throughout this map unit. Contrasting inclusions make up about 10 percent of the map unit.

Most of this map unit is used as pasture and hayland or as woodland.

This Ostin soil is moderately suited to woodland. Overstory trees are yellow-poplar, American sycamore, black cherry, eastern hemlock, white oak, river birch, black birch, northern red oak, scarlet oak, red maple, black locust, eastern white pine, and Virginia pine. Understory vegetation includes rhododendron, mountain laurel, Fraser magnolia, New York fern, Christmas fern, galax, whitecap snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. The large amount of rock fragments in the soil limits the soil water-holding capacity, and tree growth may be poor during dry periods. Seedling mortality is moderate. Flooding can limit planting or harvesting activities. Logging operations should be restricted to dry periods.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The rock fragments on and below the surface are the main limitation. Because of the rock fragments, conventional tillage is impractical. Droughtiness and the occasional flooding are additional limitations.

This soil is poorly suited to pasture and hayland. The rock fragments on the surface can be a limitation. They can hinder mowing operations. Droughtiness, the rock fragments in the soil, and the occasional flooding are additional limitations.

This soil is unsuited to most urban uses. The occasional flooding and the rock fragments are the main limitations.

The capability subclass is VIs. Based on yellow-

poplar as the indicator species, the woodland ordination symbol is 8F.

PaD—Pacolet sandy loam, 15 to 25 percent slopes. This moderately steep, very deep, well drained soil is on side slopes on the Piedmont. Individual areas are irregular in shape or elongated and range from about 5 to 200 acres in size.

Typically, the sequence, depth, and composition of the layers of this Pacolet soil are as follows—

Surface layer:
0 to 8 inches—brown sandy loam

Subsoil:
8 to 23 inches—red clay
23 to 31 inches—red clay loam

Underlying material:
31 to 40 inches—yellowish red sandy loam
40 to 60 inches—multicolored sandy loam

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Rion and Wateree soils. Rion soils have a loamy subsoil and are in areas scattered randomly throughout the county. Wateree soils have a loamy subsoil and have soft weathered bedrock at a depth of 20 to 40 inches. Some soils have a gravelly surface layer. Also included are small areas of some eroded Pacolet soils that have a surface layer of sandy clay loam and a small acreage that is actively being cultivated for row crops. The areas of row crops have an eroded surface layer. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Pacolet soil is moderately suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, loblolly pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope and depth to the predominantly clayey subsoil are the main limitations. As the slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. Depth to the predominantly clayey subsoil increases equipment limitations.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations.

This soil is moderately suited to pasture and hayland. The slope is the main limitation. Precautions are needed for operating machinery. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The slope is the main limitation. Areas on moderately steep slopes require extensive cutting and filling and detailed site planning. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is VIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

PcB2—Pacolet sandy clay loam, 2 to 8 percent slopes, eroded. This gently sloping, very deep, well drained soil is on ridgetops on the Piedmont. Individual areas are irregular in shape and range from about 4 to 150 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Pacolet soil are as follows—

Surface layer:
0 to 8 inches—brown sandy clay loam

Subsoil:
8 to 23 inches—red clay
23 to 31 inches—red clay loam

Underlying material:
31 to 40 inches—yellowish red sandy loam
40 to 60 inches—multicolored sandy loam

This soil has moderate permeability. Surface runoff is medium in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Bethlehem and Rion soils. Bethlehem soils have soft weathered bedrock at a depth of 20 to 40 inches. They are on the narrow parts of ridgetops in the northeastern part of the county. Rion soils have a loamy subsoil.

They are in areas scattered randomly throughout the county. Some soils have a gravelly surface layer. Also included are small areas of soils similar to the Pacolet soil. These similar soils include the slightly eroded Pacolet soils that have a surface layer of sandy loam or loam, some areas of Wedowee soils that have a brown subsoil, and some soils that have a thicker subsoil or a high content of mica in the lower part. Contrasting inclusions make up about 25 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland.

This Pacolet soil is well suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, loblolly pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. Depth to the predominantly clayey subsoil and the texture of the topsoil are the main limitations. Depth to the predominantly clayey subsoil increases equipment limitations. The topsoil of sandy clay loam increases seedling mortality rates.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of sandy clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Depth to the predominantly clayey subsoil and the texture of the surface layer may adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The high content of clay and low strength in the subsoil are the main limitations. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6C.

PcC2—Pacolet sandy clay loam, 8 to 15 percent slopes, eroded. This strongly sloping, very deep, well drained soil is on side slopes and ridgetops on the Piedmont. Individual areas are irregular in shape and range from about 4 to 200 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Pacolet soil are as follows—

Surface layer:
0 to 8 inches—brown sandy clay loam

Subsoil:
8 to 23 inches—red clay
23 to 31 inches—red clay loam

Underlying material:
31 to 40 inches—yellowish red sandy loam
40 to 60 inches—multicolored sandy loam

This soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. Good tilth is difficult to maintain because of the high content of clay, a low content of organic matter, and poor soil structure in the surface layer. The surface layer, if unvegetated, crusts after rains. If the soil is worked when wet, clods form and are difficult to crush. Crusting and clods interfere with seed germination. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small areas of Bethlehem, Chewacla, and Rion soils. Bethlehem soils have soft weathered bedrock at a depth of 20 to 40 inches. They are on the narrow parts of ridgetops in the northeastern part of the county. Chewacla soils have a loamy subsoil. They are somewhat poorly drained and are on small flood plains. Rion soils have a loamy subsoil. They are in areas scattered randomly throughout the county. Some soils have a gravelly surface layer. Also included are small areas of soils similar to the Pacolet soil. These similar soils include the slightly eroded Pacolet soils that have a surface layer of sandy loam or loam, Wedowee soils that have a brown subsoil, and some soils that have a thicker subsoil or a high content of mica in the lower part. Contrasting inclusions make up about 25 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland.

This Pacolet soil is well suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine,

loblolly pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. Depth to the predominantly clayey subsoil and the texture of the topsoil are the main limitations. Depth to the predominantly clayey subsoil increases equipment limitations. The topsoil of sandy clay loam increases seedling mortality rates.

This soil is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, a hazard of erosion, and the slope are limitations. The surface layer of sandy clay loam may form clods if the soil is tilled when it is too wet. In addition, seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland (fig. 6). Depth to the predominantly clayey subsoil and the texture of the surface layer may adversely affect the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses. The slope and the high content of clay and low strength in the subsoil are the main limitations. Strongly sloping areas require more cutting and filling and more detailed site planning. Where the soil is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6C.

PrC—Pacolet-Urban land complex, 2 to 15 percent slopes. This map unit consists of areas of a very deep, well drained Pacolet soil and areas of Urban land on gently sloping to strongly sloping ridgetops and side slopes in and around small towns and housing developments on the Piedmont. The Pacolet soil occurs as undisturbed areas between buildings, roads, streets, and parking lots. Individual areas are generally rectangular in shape and range from about 5 to 100 acres in size. This unit is about 50 percent Pacolet soil and 30 percent Urban land. The Pacolet soil and Urban land are so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Pacolet soil are as follows—

Surface layer:
0 to 8 inches—brown sandy clay loam

Subsoil:
8 to 23 inches—red clay
23 to 31 inches—red clay loam

Underlying material:
31 to 40 inches—yellowish red sandy loam
40 to 60 inches—multicolored sandy loam

The Pacolet soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included with this unit in mapping are small areas of Udorthents and Masada and Rion soils. Udorthents consist of areas of cut and fill. They are adjacent to the impervious surfaces of Urban land. Masada soils have a moderate shrink-swell potential in the subsoil. They occur randomly on stream terraces. Rion soils have a loamy subsoil. They are in areas scattered randomly throughout the map unit. Also included are small areas of soils similar to the Pacolet soil. These similar soils include the slightly eroded Pacolet soils that have a surface layer of sandy loam or loam and soils that have a thicker subsoil or a high content of mica in the lower part. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as urban land or for yards, gardens, recreational areas, and landscaping on and around urban land. Areas of the Pacolet soil are too small for commercial woodland production, cropland, or pasture and hayland.

This map unit is moderately suited to most urban uses. The slope and the high content of clay and low strength in the subsoil are the main limitations. Areas on slopes of more than 8 percent require more cutting and filling and more detailed site planning. Where the unit is used for septic tank absorption fields, the moderate permeability in the predominantly clayey

Figure 6.—An area of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded, which is well suited to pasture. Wilkes County is ranked first in the state in beef cattle production.

subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Undisturbed areas of the Pacolet soil are moderately suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. However, areas that have been cut, filled, or compacted may be poorly suited. Onsite investigation is needed to determine limitations for this map unit because the open areas are small.

The capability subclass is IVe in areas of the Pacolet soil and VIIIs in areas of the Urban land. This map unit is not assigned a woodland ordination symbol.

PrD—Pacolet-Urban land complex, 15 to 25 percent slopes. This map unit consists of areas of a very deep, well drained Pacolet soil and areas of Urban land on moderately steep ridgetops and side slopes in and around small towns and housing developments on the Piedmont. The Pacolet soil occurs as undisturbed areas between buildings, roads, streets, and parking lots. Individual areas are generally rectangular in shape and range from about 5 to 50 acres in size. This unit is about 50 percent Pacolet soil and 30 percent Urban land. The Pacolet soil and Urban land are so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Pacolet soil are as follows—

Surface layer:
0 to 8 inches—brown sandy loam

Subsoil:
8 to 23 inches—red clay
23 to 31 inches—red clay loam

Underlying material:
31 to 40 inches—yellowish red sandy loam
40 to 60 inches—multicolored sandy loam

The Pacolet soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included with this unit in mapping are small areas of Udorthents and Rion soils. Udorthents consist of areas of cut and fill. They are adjacent to the impervious surfaces of Urban land. Rion soils have a loamy subsoil. They are in areas scattered randomly throughout the map unit. Also included are small areas of soils similar to the Pacolet soil. These similar soils include the eroded Pacolet soils that have a surface layer of sandy clay loam and soils that have a high content of mica in the lower part. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as urban land or for yards and landscaping on and around urban land. Areas of the Pacolet soil are too small for commercial woodland production, cropland, or pasture and hayland.

This map unit is poorly suited to most urban uses even though some areas are extensively used for urban development. The slope and the high content of clay and low strength in the subsoil are the main limitations. Extensive cutting and filling and more detailed site planning are required. Where the unit is used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Onsite investigation is needed to determine limitations for this map unit because the open areas are small.

The capability subclass is VIe in areas of the Pacolet soil and VIIIs in areas of the Urban land. This map unit is not assigned a woodland ordination symbol.

Pt—Pits, quarries. This map unit consists of areas where all of the soil material has been removed and the underlying rock has been mined for gravel. The bottom of the pits is predominantly rock. Several small gravel pits are in areas scattered throughout Wilkes County. They range in size from about 2 to 65 acres.

Included with this unit in mapping are a few small areas of spoil material, where unused soil material and rock have been dumped. These areas support very little vegetation.

This map unit is unsuited to cropland, pasture, building site development, recreational facilities, and woodland. All interpretations for soil potential require onsite investigation.

The capability subclass is VIIIs. This map unit is not assigned a woodland ordination symbol.

PwD—Porters loam, 15 to 25 percent slopes, stony. This moderately steep, deep, well drained soil is on ridgetops in the higher mountains in the northwestern part of Wilkes County. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and are as much as 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Porters soil are as follows—

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 39 inches—dark yellowish brown sandy loam

Underlying material:
39 to 57 inches—dark yellowish brown loamy sand

Bedrock:
57 to 60 inches—soft weathered gneiss

This soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 40 to 60 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Ashe, Chestnut, and Edneyville soils. These soils do not have a dark surface layer at least 7 inches thick. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils are very deep. Also included are soils that do not have bedrock within a depth of 60 inches and soils that have hard unweathered bedrock at a depth of 40 to 60 inches. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Porters soil is moderately suited to the production of trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, chestnut oak, hickory, red maple, black birch, yellow birch, eastern hemlock, yellow buckeye, black locust, red spruce, black gum, Virginia pine, and eastern white pine. Understory plants include New York fern, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, rhododendron, striped maple, squawroot, Indian pipe, Indian cucumber, witchhazel, Christmas fern, greenbrier, and assorted wildflowers. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. In some mapped areas trees have been stunted or broken by high winds or ice.

This soil is poorly suited to most cultivated crops. The slope and stones on the surface are the main limitations. The hazard of erosion is severe.

This soil is moderately suited to pasture and to hayland. The rock fragments on the surface and the slope are the main limitations. The rock fragments adversely affect mowing operations and the establishment of sod. The slope is a problem affecting the use of equipment. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses because of the slope and the hazard of erosion. The use of this map unit for building site development should be carefully considered. Most areas require substantial cutting and filling.

The capability subclass is VIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 11R.

RnD—Rion fine sandy loam, 15 to 25 percent slopes. This moderately steep, very deep, well drained soil is on piedmont side slopes and narrow ridgetops. Individual areas are irregular in shape and range from about 4 to 80 acres in size.

Typically, the sequence, depth, and composition of the layers of this Rion soil are as follows—

Surface layer:

0 to 4 inches—brown fine sandy loam

Subsoil:

4 to 8 inches—reddish yellow loam
8 to 21 inches—yellowish red clay loam
21 to 30 inches—yellowish red sandy clay loam

Underlying material:

30 to 42 inches—strong brown sandy loam
42 to 60 inches—multicolored sandy loam

This soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Pacolet, Wedowee, Bethlehem, Wateree, Ashlar, and Chewacla soils. Pacolet, Wedowee, and Bethlehem soils have a predominantly clayey subsoil. Pacolet and Wedowee soils occur randomly throughout the map unit. Bethlehem soils are on the smooth parts of side slopes, mainly in the northeastern part of the county. Bethlehem and Wateree soils have soft weathered bedrock at a depth of 20 to 40 inches. Wateree soils are on steep and very steep side slopes. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches and commonly have stones on the surface. They are on the smooth parts of slopes. Chewacla soils are somewhat poorly drained. They are on flood plains in areas that are too small to be shown at the scale used in mapping. Also included are small random areas of rock outcrops. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

This Rion soil is moderately suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine,

southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope is the main limitation. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations.

This soil is moderately suited to pasture and hayland. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The slope is the main limitation. Areas on moderately steep slopes require extensive cutting and filling and detailed site planning. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is VIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

RnE—Rion fine sandy loam, 25 to 60 percent slopes. This steep, very deep, well drained soil is on piedmont side slopes. Individual areas are irregular in shape and range from about 4 to 200 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Rion soil are as follows—

Surface layer:

0 to 4 inches—brown fine sandy loam

Subsoil:

4 to 8 inches—reddish yellow loam
8 to 21 inches—yellowish red clay loam
21 to 30 inches—yellowish red sandy clay loam

Underlying material:

30 to 42 inches—strong brown sandy loam
42 to 60 inches—multicolored sandy loam

This soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff is rapid or very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Wateree and Chewacla soils. Wateree soils have soft weathered bedrock at a depth of 20 to 40 inches. They are on very steep side slopes. Chewacla soils are somewhat poorly drained and are on flood plains in areas that are too small to be shown at the scale used in mapping. Also included are small rock outcrops and small areas of soils that are similar to the Rion soil but have a surface layer of loam. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland.

This Rion soil is moderately suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope is the main limitation. The equipment limitation and the hazard of erosion are greater on the steep slopes. Extreme caution should be used when operating vehicles on these slopes. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is unsuited to cultivated crops. The slope and the hazard of erosion are the main limitations.

This soil is poorly suited to pasture and hayland. The slope is the main limitation.

This soil is poorly suited to most urban uses. The slope is the main limitation. Areas on steep slopes require excessive cutting and filling and detailed site planning. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use.

The capability subclass is VIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

RsD—Rion-Ashlar complex, 15 to 35 percent slopes, stony. This map unit consists of a very deep, well drained Rion soil and a moderately deep, excessively drained Ashlar soil on moderately steep and steep piedmont side slopes and narrow ridgetops in the northeastern part of Wilkes County. The Rion soil commonly is on broad side slopes and in convex areas. The Ashlar soil is on narrow side slopes and on nose slopes. It has more rock outcrops and surface stones than the Rion soil. In many areas both soils occur in the

same landscape position. Rock fragments on the surface range from boulders to cobbles, average 1 foot in diameter, and are 25 to 80 feet apart. Individual areas are irregular in shape and range from about 5 to 200 acres in size. This unit is about 60 percent Rion soil and about 20 percent Ashlar soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Rion soil are as follows—

Surface layer:
0 to 4 inches—brown fine sandy loam

Subsoil:
4 to 8 inches—reddish yellow loam
8 to 21 inches—yellowish red clay loam
21 to 30 inches—yellowish red sandy clay loam

Underlying material:
30 to 42 inches—strong brown sandy loam
42 to 60 inches—multicolored sandy loam

The Rion soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Ashlar soil are as follows—

Surface layer:
0 to 3 inches—grayish brown gravelly sandy loam
3 to 8 inches—pale brown gravelly sandy loam

Subsoil:
8 to 22 inches—yellowish brown sandy loam

Underlying material:
22 to 30 inches—yellowish brown coarse sandy loam

Bedrock:
30 inches—hard unweathered granodiorite

The Ashlar soil has moderately rapid permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard unweathered bedrock ranges from 20 to 40 inches. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small areas of Pacolet and Wedowee soils. These soils have a predominantly clayey subsoil. They are in the less sloping areas, mainly on smooth side slopes and ridgetops. They occur randomly throughout the map unit. Also included are small random areas of rock outcrops and soils that have hard unweathered bedrock at a depth of 40 to 60 inches. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland. The rest is used as pasture and hayland.

These Rion and Ashlar soils are moderately suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope is the main limitation. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. Stones on the surface also can cause an equipment limitation. Seedling mortality is severe in areas of the Ashlar soil. A moderate hazard of windthrow is an additional limitation in areas of the Ashlar soil.

These soils are unsuited to most of the field and truck crops commonly grown in the county. The slope, the hazard of erosion, and stones on the surface are the main limitations.

These soils are moderately suited to pasture and hayland. This map unit is poorly suited to pasture and hayland on slopes greater than 25 percent. The slope is the main limitation. Stones on the surface can hinder mowing operations. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are poorly suited to most urban uses. The slope and the depth to hard unweathered bedrock are the main limitations. Areas on moderately steep slopes require extensive cutting and filling and detailed site planning. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. In areas of the Ashlar soil, hard unweathered bedrock is at a depth of 20 to 40 inches and is a severe limitation.

The capability subclass is VIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R in areas of the Rion soil and 6R in areas of the Ashlar soil.

RwC—Rion-Wedowee complex, 5 to 15 percent slopes. This map unit consists of very deep, well

drained Rion and Wedowee soils on strongly sloping ridgetops in the northeastern part of Wilkes County. Individual areas are irregular in shape and range from about 5 to 250 acres in size. This unit is about 60 percent Rion soil and 30 percent Wedowee soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Rion soil are as follows—

Surface layer:
0 to 4 inches—brown fine sandy loam

Subsoil:
4 to 8 inches—reddish yellow loam
8 to 21 inches—yellowish red clay loam
21 to 30 inches—yellowish red sandy clay loam

Underlying material:
30 to 42 inches—strong brown sandy loam
42 to 60 inches—multicolored sandy loam

The Rion soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Wedowee soil are as follows—

Surface layer:
0 to 5 inches—dark yellowish brown sandy loam

Subsoil:
5 to 23 inches—yellowish red clay
23 to 36 inches—yellowish red sandy clay loam

Underlying material:
36 to 60 inches—multicolored sandy loam

The Wedowee soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction is very strongly acid or strongly acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Pacolet and Ashlar soils. Pacolet soils have a surface layer of sandy clay loam and a red, predominantly clayey subsoil. They are on the broad parts of ridgetops. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Also included are a few soils that have a gravelly or cobbly surface layer and small areas of soils that are similar to the Rion and Wedowee soils but have an eroded surface layer of sandy clay loam. Stones occur on the surface in a few areas. Contrasting inclusions make up about 10 percent of this map unit.

Most of this map unit is used as cropland or pasture.

These Rion and Wedowee soils are well suited to the production of trees. Overstory trees include white oak, scarlet oak, black oak, southern red oak, red maple, yellow-poplar, hickory, eastern white pine, shortleaf pine, and Virginia pine. Understory plants include sourwood, flowering dogwood, American holly, red cedar, honeysuckle, grape, poison ivy, blackberry, and greenbrier. Depth to the predominantly clayey subsoil is the only limitation in areas of the Wedowee soil, and it causes a moderate equipment limitation. Logging should be restricted to dry periods in these areas. No other significant limitations affect woodland management.

These soils are moderately suited to most of the field and truck crops commonly grown in the county. The slope and a hazard of erosion are the main limitations. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

These soils are well suited to pasture and hayland. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are moderately suited to most urban uses. The slope is a main limitation. Strongly sloping areas require extensive cutting and filling and more detailed site planning. The high content of clay, moderate shrink-swell potential, and low strength in the subsoil of the Wedowee soil are the main limitations. Where the soils are used for septic tank absorption fields, the moderate permeability in the predominantly clayey subsoil may be overcome by increasing the size of the absorption area. Designing roads, foundations, and footings that allow for the shrinking and swelling of the subsoil, diverting runoff away from buildings, and backfilling with material that has a low shrink-swell potential help to prevent structural damage. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the Wedowee soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads in areas of both soils improves trafficability for year-round use.

The capability subclass is IVe. Based on shortleaf

pine as the indicator species, the woodland ordination symbol is 8A in areas of the Rion soil and 8C in areas of the Wedowee soil.

Rx—Rock outcrop. This map unit consists of small areas where bedrock or loose stones and boulders cover 85 percent or more of the surface. The largest areas of Rock outcrop occur on Stone Mountain, Wolf Rock, and Cedar Rock. Individual areas range from about 5 to 75 acres in size. Very little vegetation grows in this map unit. Some very small areas contain enough soil and organic material to support plant life, but these areas generally are too small for management purposes.

This map unit is unsuited to woodland, cropland, pasture and hayland, and urban uses because of the hard rock extending to the surface. The unit is used mostly for wildlife habitat and recreational purposes, such as hiking, rock climbing, and sightseeing.

The capability subclass is VIIIs. This map unit is not assigned a woodland ordination symbol.

RzA—Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded. This map unit consists of a very deep, well drained Rosman soil and a very deep, moderately well drained Reddies soil on nearly level flood plains adjacent to streams in the mountains. The Rosman soil commonly is in the slightly elevated areas on the broad parts of flood plains, in areas away from the streambed. The Reddies soil commonly is on the broad parts of flood plains, in areas near the streambed. Individual areas are mainly long and narrow and range from about 4 to more than 200 acres in size. This unit is about 55 percent Rosman soil and about 30 percent Reddies soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Rosman soil are as follows—

Surface layer:
0 to 12 inches—dark brown fine sandy loam

Subsoil:
12 to 40 inches—dark yellowish brown sandy loam

Underlying material:
40 to 60 inches—yellowish brown loam that has yellow and light gray mottles

The Rosman soil has moderately rapid permeability. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 2.5 to 5.0 feet. The soil is occasionally flooded for very brief periods. Soil reaction ranges from strongly acid to slightly acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Reddies soil are as follows—

Surface layer:
0 to 10 inches—dark brown fine sandy loam

Subsoil:
10 to 29 inches—yellowish brown sandy loam

Underlying material:
29 to 60 inches—dark yellowish brown extremely gravelly sand

The Reddies soil has moderately rapid permeability. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 2.0 to 3.5 feet. The soil is occasionally flooded for very brief periods. Soil reaction ranges from very strongly acid to neutral.

Included in this unit in mapping are small areas of Tate, Cullowhee, and Ostin soils. The finer textured Tate soils are on low terraces. Cullowhee soils are somewhat poorly drained and are in depressions on flood plains. Ostin soils have an average of more than 35 percent, by volume, rock fragments throughout. They are in the upper reaches of some mapped areas where stream velocity is high. Also included are small areas of soils that have a gravelly or cobbly surface layer, poorly drained soils in depressions, and soils that are similar to the Reddies and Rosman soils. These similar soils have a surface layer that is less than 10 inches thick, have a surface layer of sandy or loamy overwash from recent deposition, or have sandy strata continuing throughout the profile. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as pasture and hayland or as woodland.

These Rosman and Reddies soils are well suited to woodland. Overstory trees are American sycamore, green ash, red maple, yellow-poplar, eastern white pine, black walnut, river birch, and black willow. Understory vegetation includes alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape. No significant limitations affect woodland management. A moderate hazard of windthrow is a management concern in areas of the Reddies soil. The occasional flooding can limit planting or harvesting activities. Logging operations should be restricted to dry periods.

These soils are well suited to most of the field and truck crops commonly grown in the county. Ornamental

Figure 7.—An area of Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded, that produces high yields of hay.

trees and shrubs also grow well on these soils. The occasional flooding can be a problem. Returning crop residue to the soils and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

These soils are well suited to pasture and hayland (fig. 7). The occasional flooding may be a problem. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are unsuited to most urban uses. The occasional flooding is a severe limitation. Some

individual areas may be used for recreational activities, such as ball fields and playgrounds, where flooding is not so important.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

StB—State fine sandy loam, 1 to 6 percent slopes, rarely flooded. This gently sloping, very deep, well drained soil is on low stream terraces along many of the larger streams of the Piedmont. Individual areas are mainly somewhat elongated and range from about 4 to 50 acres in size.

Typically, the sequence, depth, and composition of the layers of this State soil are as follows—

Surface layer:
0 to 10 inches—brown fine sandy loam

Subsoil:
10 to 20 inches—dark yellowish brown fine sandy loam
20 to 38 inches—strong brown sandy clay loam
38 to 58 inches—dark yellowish brown fine sandy loam

Underlying material:
58 to 72 inches—brown loamy sand

This soil has moderate permeability. Surface runoff is medium in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 4 to 6 feet. The soil is rarely flooded. Soil reaction is very strongly acid or strongly acid in the surface layer and in the upper part of the subsoil unless the soil is limed and ranges from very strongly acid to slightly acid in the lower part of the subsoil and in the underlying material.

Included in this unit in mapping are small areas of Masada, Chewacla, Toccoa, and Dogue soils. Masada soils have a predominantly clayey subsoil. They are in the higher areas on terraces. Chewacla soils are frequently flooded and are in depressions. Toccoa soils have less clay in the subsoil than the State soil and occur closer to streambanks. Dogue soils have a predominantly clayey subsoil and are on low stream terraces. Also included are a few areas of State soils that are occasionally flooded. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as cropland, hayland and pasture, or woodland.

This State soil is well suited to woodland. Overstory trees are loblolly pine, scarlet oak, white oak, red maple, shortleaf pine, southern red oak, hickory, American beech, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland use and management.

This soil is well suited to most of the field and truck crops commonly grown in the county. The slope and a hazard of erosion are limitations. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. Wetness, the low strength in the subsoil, and the rare flooding are the main limitations. Diverting runoff away from buildings and installing perforated drainage tile around foundations help to reduce the wetness. Mixing the soil with sand and gravel and providing proper compaction increase the strength and stability of the soil for use as a base for roads and streets. Providing a gravel base and an adequate wearing surface for roads improves trafficability for year-round use. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along the Yadkin River. This flood-control structure reduces the frequency of flooding but does not eliminate the possibility of floods.

The capability subclass is IIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

TaD—Tate fine sandy loam, 8 to 25 percent slopes. This strongly sloping and moderately steep, very deep, well drained soil is on toe slopes and in coves in the mountains. Individual areas are mainly long and narrow and range from about 4 to 80 acres in size.

Typically, the sequence, depth, and composition of the layers of this Tate soil are as follows—

Surface layer:
0 to 3 inches—dark brown fine sandy loam
3 to 9 inches—brown fine sandy loam

Subsoil:
9 to 15 inches—dark yellowish brown loam
15 to 43 inches—yellowish brown loam

Underlying material:
43 to 60 inches—yellowish brown fine sandy loam

This soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum.

Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Braddock and Cullowhee soils. Braddock soils have a red, predominantly clayey subsoil. They are in areas randomly scattered throughout the map unit. Cullowhee soils are somewhat poorly drained and are in depressions and low areas on flood plains. They have gravelly or cobbly strata within a depth of 20 to 40 inches. Some Tate soils have stones on the surface. Also included are small areas of soils that are similar to the Tate soil but have a dark surface layer and are at the higher elevations where temperatures are cooler. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland or as pasture and hayland. A small acreage is used as cropland, predominantly where slopes are less than 15 percent.

This Tate soil is well suited to woodland on slopes of less than 15 percent and moderately suited on slopes greater than 15 percent. Overstory trees are American sycamore, red maple, yellow-poplar, Virginia pine, black locust, scarlet oak, northern red oak, eastern white pine, black oak, and black willow. Understory vegetation includes alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, sourwood, flowering dogwood, rhododendron, mountain laurel, and wild grape. The slope is the main limitation affecting woodland management. Where slopes are more than 15 percent, equipment limitations and the hazard of erosion are greater. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

Where slopes are less than 15 percent, this soil is moderately suited to most field and truck crops commonly grown in the county. The slope and a hazard of erosion are the main limitations. Where slopes are greater than 15 percent, the hazard of erosion is severe. In these areas the soil is poorly suited to most of the field and truck crops commonly grown in the county. Contour farming, conservation tillage, grassed waterways, and field borders help to control erosion. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

Where slopes are less than 15 percent, this soil is well suited to pasture and hayland and has no significant limitations. Where slopes are more than 15 percent, equipment limitations are greater and the soil is moderately suited to pasture and hayland. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

Where slopes are less than 15 percent, this soil is moderately suited to most urban uses. Where slopes are greater than 15 percent, limitations are severe and the soil is poorly suited to most urban uses. These areas require substantial cutting and filling. Onsite investigations are needed to ensure proper use and management.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R.

TcC—Tate-Cullowhee complex, 0 to 25 percent slopes. This map unit consists of a very deep, well drained Tate soil and a very deep, somewhat poorly drained Cullowhee soil in valleys and coves along the headwaters of streams flowing out of the mountains. The gently sloping to moderately steep Tate soil is on toe slopes adjacent to the lower flood plains. The nearly level Cullowhee soil is on narrow flood plains that are typically less than 200 feet wide. Individual areas are mainly long and narrow and range from about 4 to 40 acres in size. This unit is about 55 percent Tate soil and 25 percent Cullowhee soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Tate soil are as follows—

Surface layer:
0 to 3 inches—dark brown fine sandy loam
3 to 9 inches—brown fine sandy loam

Subsoil:
9 to 15 inches—dark yellowish brown loam
15 to 43 inches—yellowish brown loam

Underlying material:
43 to 60 inches—yellowish brown fine sandy loam

The Tate soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Typically, the sequence, depth, and composition of the layers of this Cullowhee soil are as follows—

Surface layer:

0 to 12 inches—dark brown fine sandy loam

Underlying material:

12 to 20 inches—brown fine sandy loam that has dark grayish brown, dark yellowish brown, and strong brown mottles

20 to 31 inches—dark grayish brown sandy loam that has dark brown mottles

31 to 60 inches—dark gray extremely gravelly sand that has dark brown mottles

The Cullowhee soil has moderately rapid permeability in the surface layer and rapid permeability in the underlying material. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 1.5 to 2.0 feet. The soil is frequently flooded for very brief periods. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Ostin and Braddock soils. Ostin soils are well drained and are on flood plains, commonly next to streambeds. They contain more than 35 percent rock fragments throughout. Braddock soils have a red, predominantly clayey subsoil. They are in areas randomly scattered throughout the map unit, commonly in the higher landscape positions. Some Tate soils have stones on the surface or have a high water table between a depth of 40 and 60 inches, or both. Also included are poorly drained soils in depressions on flood plains and small areas of soils that are similar to the Tate and Cullowhee soils but have a dark surface layer and are at the higher elevations where temperatures are cooler. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland. Some of the broader areas are used as cropland or as pasture and hayland, especially where slopes are less than 15 percent.

These Tate and Cullowhee soils generally are moderately suited to woodland. Where slopes are less than 15 percent, the Tate soil is well suited to woodland. Overstory trees are American sycamore, red maple, yellow-poplar, yellow birch, eastern hemlock, eastern white pine, Virginia pine, black locust, scarlet oak, northern red oak, black oak, and black willow. Understory vegetation includes alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, sourwood, flowering dogwood, rhododendron, mountain laurel, and wild grape. The slope is the main limitation affecting woodland management. Where slopes are more than 15 percent, equipment limitations and the hazard of erosion are greater. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The frequent flooding and wetness are limitations affecting woodland management in areas of the Cullowhee soil. An excessive amount of water during wet periods or during flooding increases seedling mortality rates and equipment limitations.

Where slopes are less than 15 percent, these soils are moderately suited to most of the field and truck crops commonly grown in the county. Where slopes are greater than 15 percent, the soils are generally poorly suited to most of these crops. The slope and the frequent flooding and wetness in areas of the Cullowhee soil are the main limitations. However, in areas that are drained and do not flood during the growing season, the soils are well suited to crops. Artificial subsurface drainage systems are needed to increase productivity. Surface drainage systems may also be needed. The slope and a hazard of erosion are the main limitations in areas of the Tate soil. Where slopes range from 15 to 25 percent, the hazard of erosion is severe. Contour farming, conservation tillage, grassed waterways, and field borders help to control erosion on the Tate soil. Returning crop residue to the soils and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth in areas of both soils.

Where slopes are less than 15 percent, these soils are well suited to pasture and hayland. Where slopes range from 15 to 25 percent, the Tate soil is moderately suited to pasture and hayland because of the hazard of erosion and equipment limitations. Areas of the Cullowhee soil that are frequently flooded during the growing season and are not drained are moderately suited to pasture and hayland. Artificial surface and subsurface drainage systems may be needed to improve productivity on the Cullowhee soil. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

In areas that are outside the flood plain and have slopes of less than 15 percent, these soils are moderately suited to most urban uses. In areas that have slopes of 15 to 25 percent, the Tate soil has severe limitations and is poorly suited to most urban uses. Areas that have slopes of more than 15 percent commonly require substantial cutting and filling. In areas on flood plains, the Cullowhee soil is unsuited to most urban uses. The frequent flooding and wetness are severe limitations in areas of the Cullowhee soil.

The capability subclass is VIe in areas of the Tate soil and IIIw in areas of the Cullowhee soil. Based on

yellow-poplar as the indicator species, the woodland ordination symbol is 6R in areas of the Tate soil and 8W in areas of the Cullowhee soil.

ToA—Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded. This nearly level, very deep, well drained soil is on flood plains on the Piedmont. Individual areas are mainly long and narrow and range from about 5 to 200 acres or more in size.

Typically, the sequence, depth, and composition of the layers of this Toccoa soil are as follows—

Surface layer:

0 to 8 inches—dark yellowish brown sandy loam

Underlying material:

8 to 55 inches—dark yellowish brown sandy loam
55 to 60 inches—yellowish brown loamy sand

This soil has moderately rapid permeability. Surface runoff is slow in bare and unprotected areas. The shrink-swell potential of the underlying material is low. The depth to bedrock is greater than 5 feet. The high water table is at a depth of 2.5 to 5.0 feet. The soil is occasionally flooded for brief periods. Soil reaction ranges from strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Buncombe, Chewacla, Dogue, and State soils. The excessively drained, sandy Buncombe soils are adjacent to the deeper stream channels. Chewacla soils are somewhat poorly drained and are in depressions. Dogue soils are moderately well drained and are in the slightly elevated areas on terraces. They have a predominantly clayey subsoil. State soils are well drained and are in the slightly elevated areas on terraces. Also included are soils that have more clay in the subsoil than the Toccoa soil and small areas of soils similar to the Toccoa soil. These similar soils include soils that have a surface layer of sandy or loamy overwash from recent deposition and soils that have sandy strata continuing throughout the profile. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as cropland or as pasture and hayland. The narrower areas of the unit are used as woodland.

This Toccoa soil is well suited to woodland. Overstory trees are scarlet oak, white oak, red maple, shortleaf pine, southern red oak, river birch, American sycamore, eastern white pine, yellow-poplar, and Virginia pine. Understory vegetation includes greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. The occasional flooding can be a limitation at certain times of the year. No other significant limitations affect woodland.

This soil is well suited to most of the field and truck crops commonly grown in the county. The occasional flooding may be a problem. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

This soil is well suited to pasture and hayland. The occasional flooding may be a problem. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The occasional flooding and seasonal wetness are severe limitations. Some individual areas may be used for such purposes as ball fields and playgrounds, where seasonal wetness and flooding are not so important. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along the Yadkin River. This flood-control structure reduces the frequency of flooding but does not eliminate the possibility of floods.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

UdC—Udorthents-Urban land complex, 1 to 15 percent slopes. This map unit consists of gently sloping to strongly sloping areas of Udorthents and Urban land that are so intricately mixed that it is not practical to separate them in mapping at the scale used. Individual areas range from about 5 to 250 acres in size. This unit is about 45 percent Udorthents and 35 percent Urban land.

Udorthents generally consist of loamy soil material in areas that have been cut or filled during grading for roads, railroads, houses, shopping centers, recreational areas, and similar purposes. The cuts are generally the steepest areas of this map unit. The material exposed in the cuts is variable. The fill material is generally material removed from the cuts. Areas that have been filled are not as steep as the cuts. In some areas the fill material is highly compacted. Permeability is variable. Runoff is medium or rapid in bare and unprotected areas. The depth to bedrock and the depth to the water table are variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included with this unit in mapping are small areas of soils that have not been disturbed and areas that have been cut down to bedrock. In a few places, small areas of fill consist of nonsoil materials, such as building rubbish and miscellaneous solid garbage waste.

Contrasting inclusions make up about 20 percent of this map unit.

Areas of this map unit that have not been urbanized vary widely in their suitability and limitations for different land uses. The cut areas generally are suited to building sites and recreational areas if water and sewer services can be provided. These areas are somewhat droughty, and landscaping and vegetating the areas may be difficult. The fill areas generally are subject to subsidence and may be unsuited to building sites. The fill areas that are not highly compacted are suited to landscaping and recreational uses. Onsite investigation is necessary to determine the suitability and limitations of this map unit for any proposed use.

The capability subclass is VIIs in areas of the Udorthents and VIIIs in areas of the Urban land. This map unit is not assigned a woodland ordination symbol.

UfB—Udorthents-Urban land complex, 1 to 6 percent slopes, rarely flooded. This map unit consists of gently sloping areas of Udorthents and Urban land that are so intricately mixed that it is not practical to separate them in mapping at the scale used. This map unit occurs near the Yadkin River and its tributaries. Individual areas range from about 5 to 100 acres in size. The unit is about 45 percent Udorthents and about 35 percent Urban land.

Udorthents generally consist of loamy soil material in areas that have been cut or filled during grading for roads, railroads, houses, shopping centers, recreational areas, and similar purposes. The cuts are generally the steepest areas of this map unit. The material exposed in the cuts is variable. The fill material is generally material removed from the cuts. Areas that have been filled are not as steep as the cuts. In some areas the fill material is highly compacted. Permeability is variable. Runoff is slow to rapid in bare and unprotected areas. The depth to bedrock and the depth to the water table are variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included with this unit in mapping are small areas of soils that have not been disturbed and areas that have been cut down to bedrock. In a few places, small areas of fill consist of nonsoil materials, such as building rubbish and miscellaneous solid garbage waste. Contrasting inclusions make up about 20 percent of this map unit.

Generally, this map unit has flood-control structures in areas upstream. These structures reduce the frequency of flooding but do not eliminate the possibility of flooding. Areas of this map unit that have not been urbanized vary widely in their suitability and limitations for different land uses. The cut areas generally are suited to building sites and recreational areas if water and sewer services can be provided. The degree of suitability depends on the specific site. The cut areas are somewhat droughty, and landscaping and vegetating these areas may be difficult. The fill areas generally are subject to subsidence and may be unsuited to building sites. The fill areas that are not highly compacted are suited to landscaping and recreational uses. Onsite investigation is necessary to determine the suitability and limitations of this map unit for any proposed use.

The capability subclass is VIIs in areas of the Udorthents and VIIIs in areas of the Urban land. This map unit is not assigned a woodland ordination symbol.

WaC—Watauga loam, 8 to 15 percent slopes. This strongly sloping, very deep, well drained soil is on the broader ridgetops near the top of the Blue Ridge escarpment in the mountains. Individual areas are irregular in shape and range from about 4 to 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Watauga soil are as follows—

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 26 inches—yellowish brown sandy clay loam
26 to 31 inches—yellowish brown fine sandy loam

Underlying material:
31 to 44 inches—light yellowish brown sandy loam
44 to 60 inches—light brownish gray sandy loam

This soil has moderate permeability. Surface runoff is medium or rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Chandler, Chestnut, and Edneyville soils. The coarser Chandler soils are on side slopes and narrow ridgetops. Chestnut and Edneyville soils have less mica than the Watauga soil and a coarser subsoil. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. They occur randomly throughout the map unit. Also included are small areas that have slopes of less than 8 percent, areas that have rock outcrops and stones on the surface, and small areas of soils that are similar to the Watauga soil but have a red loamy subsoil. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland or as pasture and hayland.

This Watauga soil is well suited to the production of trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, black gum, and eastern white pine. Understory plants include rhododendron, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is moderately suited to most cultivated crops. The hazard of erosion and the slope are limitations. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is well suited to pasture and hayland. The slope and the hazard of erosion may be limitations. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is moderately suited to most urban uses because of the slope and the hazard of erosion. The use of this map unit for building site development should be carefully considered.

The capability subclass is IVe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 11A.

WaD—Watauga loam, 15 to 25 percent slopes. This moderately steep, very deep, well drained soil is on ridgetops and side slopes near the top of the Blue Ridge escarpment in the mountains. Individual areas are irregular in shape and range from about 4 to 100 acres in size.

Typically, the sequence, depth, and composition of the layers of this Watauga soil are as follows—

Surface layer:

0 to 5 inches—very dark grayish brown loam

Subsoil:

5 to 26 inches—yellowish brown sandy clay loam
26 to 31 inches—yellowish brown fine sandy loam

Underlying material:

31 to 44 inches—light yellowish brown sandy loam
44 to 60 inches—light brownish gray sandy loam

This soil has moderate permeability. Surface runoff is rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid unless the soil is limed.

Included in this unit in mapping are small intermingled areas of Chandler, Chestnut, and Edneyville soils. The coarser Chandler soils are on side slopes and narrow ridgetops. Chestnut and Edneyville soils have less mica than the Watauga soil and a coarser subsoil. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. They occur randomly throughout the map unit. Also included are areas that have rock outcrops and stones on the surface and small areas of soils that are similar to the Watauga soil but have a red loamy subsoil. Areas on some side slopes have a hazard of slippage because of the high content of mica. In these areas, large gullies have formed and much of the soil has been lost. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland or as pasture and hayland.

This Watauga soil is moderately suited to the production of trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, black gum, and eastern white pine. Understory plants include rhododendron, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion.

This soil is poorly suited to most cultivated crops. The hazard of erosion and the slope are limitations. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders help to improve tilth, conserve moisture, control erosion, and reduce offsite damage caused by sediments.

This soil is moderately suited to pasture and hayland. The slope and the hazard of erosion can be a limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses because of the slope, the high content of mica, and the hazard of

erosion. The hazard of slippage caused by the high content of mica increases as slope increases. The use of this map unit for building site development should be carefully considered.

The capability subclass is VIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 11R.

WeF—Wateree-Rion complex, 40 to 95 percent slopes. This map unit consists of a moderately deep, well drained Wateree soil and a very deep, well drained Rion soil on steep and very steep piedmont side slopes and bluffs throughout Wilkes County. The Wateree soil is mainly on very steep side slopes, nose slopes, and bluffs along rivers and drainageways. The Rion soil is mainly on steep slopes along rivers and drainageways. In some areas, both soils occur in the same landscape position. Individual areas are irregular in shape and range from about 4 to more than 200 acres in size. This unit is about 55 percent Wateree soil and 30 percent Rion soil. The two soils occur as areas so intricately mixed that it is not practical to separate them in mapping at the scale used.

Typically, the sequence, depth, and composition of the layers of this Wateree soil are as follows—

Surface layer:
0 to 4 inches—dark brown sandy loam

Subsoil:
4 to 22 inches—strong brown sandy loam

Underlying material:
22 to 34 inches—multicolored sandy loam

Bedrock:
34 to 60 inches—soft weathered schist

The Wateree soil has moderately rapid permeability. Surface runoff is very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to moderately acid.

Typically, the sequence, depth, and composition of the layers of this Rion soil are as follows—

Surface layer:
0 to 4 inches—brown fine sandy loam

Subsoil:
4 to 8 inches—reddish yellow loam
8 to 21 inches—yellowish red clay loam
21 to 30 inches—yellowish red sandy clay loam

Underlying material:
30 to 42 inches—strong brown sandy loam
42 to 60 inches—multicolored sandy loam

The Rion soil has moderate permeability. Surface runoff is very rapid in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 5 feet. The high water table is below a depth of 6 feet. Soil reaction ranges from very strongly acid to slightly acid.

Included in this unit in mapping are Chewacla, Toccoa, and Ashlar soils. Chewacla and Toccoa soils are on narrow flood plains. They are in areas that are too small to be shown at the scale used in mapping. Chewacla soils are somewhat poorly drained and are in depressions. Toccoa soils are well drained and are in the higher areas on flood plains. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Also included are soils that have soft weathered bedrock within a depth of 20 inches, areas that have stones and gravel on the surface, and small random areas of rock outcrops. Contrasting inclusions make up about 15 percent of this map unit.

Almost all of this map unit is used as woodland.

These Wateree and Rion soils are poorly suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory vegetation includes sourwood, flowering dogwood, American holly, red cedar, greenbrier, honeysuckle, grape, poison ivy, and blackberry. The slope is the main limitation. As slope increases, equipment limitations and the hazard of erosion increase. Logging roads and skid trails should be installed on the contour. Water bars help to control the flow of water along roads. Applying lime and fertilizer and seeding all areas of exposed soil help to control erosion. The depth to bedrock can be a problem in areas of the Wateree soil. A moderate hazard of windthrow is also a management concern in areas of the Wateree soil.

These soils are unsuited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations.

These soils generally are unsuited to pasture and hayland. Some small areas that have slopes of less than 50 percent are poorly suited to pasture and hayland. The slope is the main limitation. The slope hinders the operation of all types of machinery. Seeding and establishing a cover are very difficult if the surface has been disturbed.

These soils are unsuited to most urban uses. The slope and the depth to soft weathered bedrock are the main limitations. Areas on very steep slopes require

extensive cutting and filling and detailed site planning.

The capability subclass is VIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

WhA—Wehadkee loam, 0 to 2 percent slopes, frequently flooded. This nearly level, very deep, poorly drained soil is on flood plains on the Piedmont. Individual areas are mainly long and narrow and range from about 3 to 12 acres in size.

Typically, the sequence, depth, and composition of the layers of this Wehadkee soil are as follows—

Surface layer:

0 to 6 inches—dark gray loam

Subsoil:

6 to 20 inches—dark gray sandy clay loam that has dark grayish brown, dark yellowish brown, and strong brown mottles

20 to 32 inches—dark gray clay loam that has dark grayish brown mottles

Underlying material:

32 to 60 inches—dark gray sandy loam that has dark grayish brown mottles

This soil has moderate permeability. Surface runoff is very slow in bare and unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is greater than 5 feet. The high water table is within a depth of 1 foot. The soil is frequently flooded for brief periods. Soil reaction ranges from very strongly acid to slightly acid unless the soil is limed.

Included in this unit in mapping are small areas of Chewacla soils. These somewhat poorly drained soils are in the slightly convex areas. Also included are small areas of soils that are similar to the Wehadkee soil but have a predominantly clayey subsoil, have a thin layer of sandy overwash, have a very dark gray and black surface layer and subsoil continuing throughout the profile, or are ponded during wet periods. Contrasting inclusions make up about 20 percent of this map unit.

Most of this map unit is used as woodland.

This Wehadkee soil is poorly suited to woodland. Overstory trees are American sycamore, white ash, green ash, water oak, willow oak, red maple, yellow-poplar, river birch, and black willow. Understory vegetation includes alder, American hornbeam, greenbrier, honeysuckle, blackberry, cattail, bulrush, switchcane, sedges, poison ivy, and wild grape. The frequent flooding and wetness are the main limitations. An excessive amount of water increases seedling mortality rates and equipment limitations. A moderate hazard of windthrow is an additional limitation.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. Wetness and the frequent flooding are problems. Artificial surface and subsurface drainage systems are needed. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve soil fertility, the soil moisture-holding capacity, and tilth.

This soil is poorly suited to pasture and hayland. Wetness and the frequent flooding are the main limitations. Artificial surface and subsurface drainage systems are needed. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The frequent flooding and wetness are severe limitations. Some areas of urban buildup are near the W. Kerr Scott Reservoir Dam along the Yadkin River. This flood-control structure reduces the frequency of flooding but does not eliminate the possibility of floods.

The capability subclass is VIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8W.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Generally, except for soils subject to flooding, soils in Wilkes County that are well suited or moderately suited to crops have similar suitability for urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Ronald C. Howard, district conservationist, and Bobby C. Brock, conservation agronomist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified, the system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Farms in Wilkes County are diverse (fig. 8). Crops, pasture, hayland, and poultry production all provide agricultural income. The acreage of cropland in the county has slightly decreased during the past 10 years. Cropland has been converted to pasture and hayland because of profit loss in farming row crops. Farmers have since started poultry productions and use the poultry waste to fertilize pastures.

In 1990, Wilkes County had approximately 22,000 acres of harvested cropland. This acreage included about 13,000 acres of hayland, 880 acres of flue-cured tobacco, 5,100 acres of corn, 900 acres of soybeans, 900 acres of small grain, and 170 acres of grain sorghum. Small grain crops include wheat, oats, barley, and rye. The hayland consists mainly of tall fescue, but the county has small acreages of alfalfa, orchardgrass, red clover, and mixtures of red clover and orchardgrass *(9)*. According to the North Carolina Cooperative Extension Service, the county has about 32,000 acres of pasture and 2,000 acres of orchards.

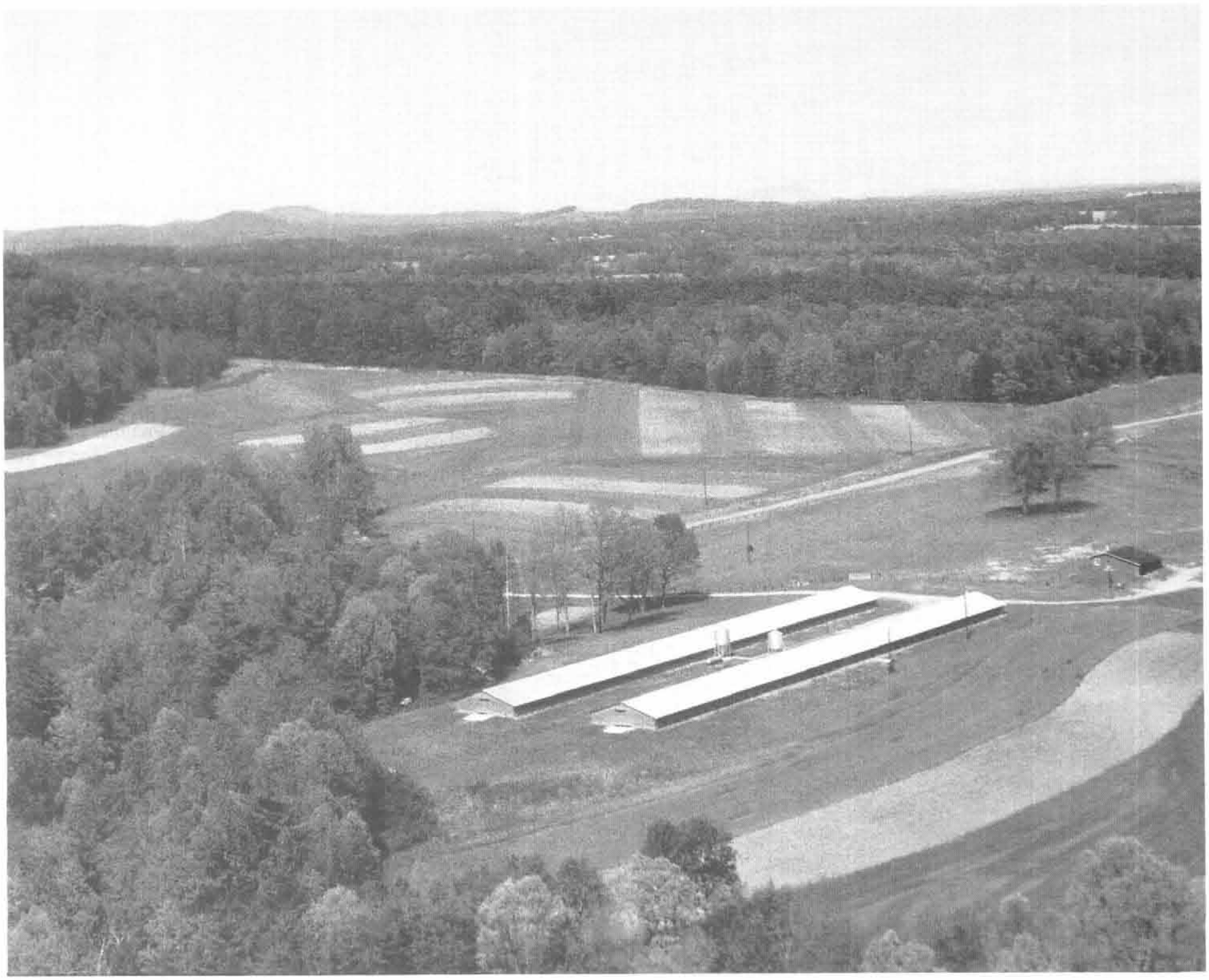

Figure 8.—A typical farm operation in Wilkes County. It includes areas for chicken production, pastureland for cattle, cropland managed by contour stripcropping for tobacco and small grain, and small forested areas intermingled with other areas throughout the farm.

Most of the row crops in the county are grown on well drained, gently sloping to strongly sloping soils, such as Pacolet and Masada soils. Nearly level soils on flood plains, such as Rosman, Reddies, and Toccoa soils, also are used for row crops. Strongly sloping and moderately steep soils, such as Pacolet, Rion, Evard, Cowee, Tate, and Braddock soils, are commonly used for hay and pasture.

A small acreage in the county is used for melons, strawberries, sweet corn, tomatoes, pepper, broccoli, or other vegetables and fruits. Deep and very deep soils that are characterized by good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits.

The latest information on growing specialty crops, such as information on site selection, fertilization, liming, and selection of plant varieties, can be obtained from the local office of the North Carolina Cooperative Extension Service or the Natural Resources Conservation Service.

Cropland

Management concerns for cropland in Wilkes County include controlling erosion, installing a drainage system,

improving soil fertility, applying a system of chemical weed control, and improving tilth.

Erosion control.—Soil erosion is a major concern on about three-fourths of the cropland in the county. The only soils in the county that are not subject to accelerated erosion and are considered agriculturally productive are Toccoa, Cullowhee, Chewacla, Reddies, and Rosman soils on flood plains. Erosion is a hazard on all of the upland soils. Pacolet soils, which have already lost part of their topsoil in most areas, particularly need erosion-control measures because most of the upland farming is on these soils.

Loss of the surface layer through erosion is damaging. Soil productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Pacolet, Wedowee, Bethlehem, Masada, Hayesville, and Braddock soils. Deep plowing using larger tractors and plows further mixes the subsoil and topsoil layers. Soil erosion on farmland results in the sedimentation of streams and reservoirs. Controlling erosion minimizes the pollution of streams by sediments and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Resource management systems provide a protective surface cover, help to control runoff, and increase the rate of water infiltration. Maintaining a plant cover helps to limit the amount of soil lost through erosion. In sloping areas, including grasses and legumes in the cropping system helps to control erosion. The forage crops improve overall soil tilth. Improved cropping systems, conservation tillage, crop residue management, terraces, stripcropping, grassed waterways, contour farming, and field borders can help to control erosion and improve productivity on cropland (fig. 9).

In many sloping areas of clayey soils, preparing a good seedbed is difficult because much or all of the original friable surface layer has been lost through erosion. This degree of erosion is common in areas of Pacolet soils.

Minimizing tillage and leaving crop residue on the surface increase the rate of water infiltration, reduce the hazards of runoff, and help to control erosion. These practices are effective on the cropland in Wilkes County.

Contour farming and stripcropping help to control erosion on many of the soils in the county. They are best suited to soils that have smooth, uniform slopes.

Information on erosion-control measures for each kind of soil is available at the local office of the Natural Resources Conservation Service.

Drainage.—Wetness is a management concern on only about 2 percent of the soils in Wilkes County that are used for crops or pasture. Areas of Wehadkee, Chewacla, and Cullowhee soils have a high water table and are subject to flooding. Where permitted, installing surface or subsurface drains, or both, can lower the water table in these soils and thus improve drainage and increase yields.

Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Soil fertility.—The soils in Wilkes County generally are low in natural fertility and are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops. Many of the problems associated with low natural fertility have been overcome by using animal wastes, especially poultry wastes (fig. 10). Chewacla, Toccoa, Wehadkee, Cullowhee, Reddies, and Rosman soils are somewhat fertile because they formed in recent alluvium.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover, in some rotations of soybeans, and for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Because nitrogen can be readily leached from sandy soils, such as Buncombe soils, applications of nitrogen may be needed more than once during the growing season. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil. Specific information can be obtained from the North Carolina Cooperative Extension Service.

Chemical weed control.—The use of herbicides for weed control is a common practice on the cropland in Wilkes County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of preemergent

Figure 9.—A tobacco field in an area of Pacolet sandy clay loam, 2 to 8 percent slopes, eroded, that produces high yields. The high yields are the result of a high level of management that includes soil and water conservation practices.

herbicide application. Estimates of both of these properties were determined for the soils in this survey area. Table 15 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 14.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received large amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface

layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Tilth.—Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth have a granular and porous surface layer.

Most of the soils in Wilkes County that are used for crops have a low content of organic matter in the surface layer (less than 1 percent). On some of these soils, intense rainfall on a bare surface causes the formation of a crust. After the crust forms, the soil is almost impervious to water. The crust reduces the infiltration rate and increases the runoff rate. Regularly adding crop residue or manure or maintaining a dense vegetative cover (sod) improves soil structure and reduces the hazard of crusting and thus increases the infiltration rate. A content of organic matter between 1.5 and 2.0 percent is good. Soils that have a higher content of clay, such as Pacolet, Masada, Hayesville, and Braddock soils, become cloddy if they are cultivated under wet conditions. The sustained use of no-till farming that maintains 80 percent or more ground cover can improve the physical, chemical, and biological properties of the soil.

Some soils in the survey area have poor tilth

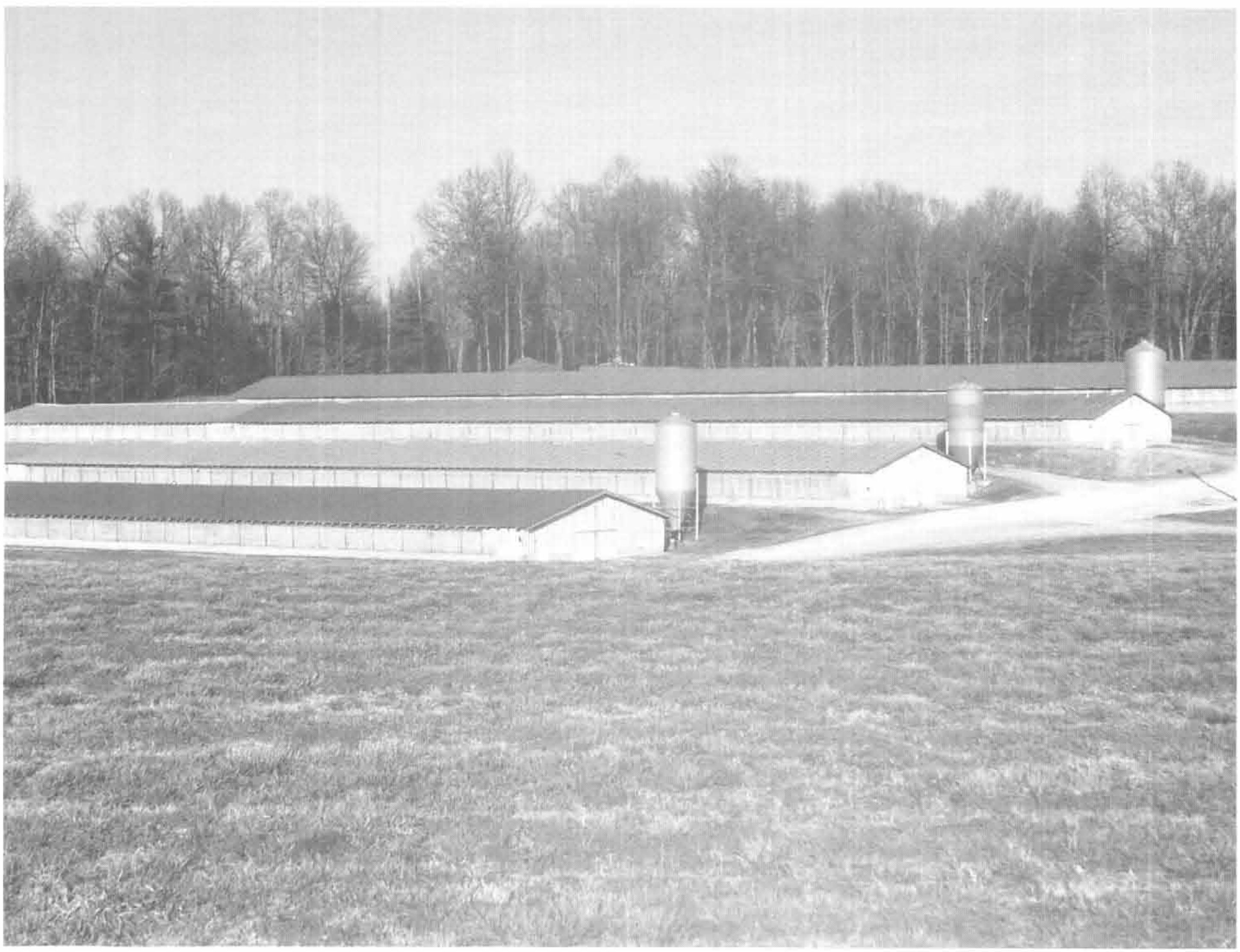

Figure 10.—Poultry production is the leading source of farm income in Wilkes County. Litter from the chicken houses is used to fertilize pasture and hayland.

because of gravel in the surface layer. The content and size of the pebbles affect the use of tillage implements.

Stones and boulders are common in some of the colluvial soils in the survey area. In some places these rock fragments prevent tillage. In other places they can be removed.

Pasture and Hayland

In 1991, Wilkes County had more than 30,000 beef and dairy cattle *(9)*. Most of the pasture and hayland in the county supports a mixture of grasses and legumes. Most of the hay is grown in rotation with pasture. The harvested hay commonly is rolled into large, round bales.

About 7 percent of the total farm income in the county is derived from the sale of livestock. A successful livestock enterprise depends on a forage program that provides large quantities of good-quality feed. In Wilkes County, poultry and beef enterprises are interdependent because poultry waste is commonly applied to pasture and hayland. Applications of poultry waste provide nutrients necessary for the production of livestock feed.

Selection of forage species.—The soils in the survey area vary widely in their ability to produce grasses and legumes because of differences in such properties as depth to bedrock or to other limiting layers, internal drainage, and available water capacity. The forage species selected for planting should be appropriate for the soil.

Most of the soils in Wilkes County are suited to locally grown grasses and legumes, such as tall fescue, orchardgrass, alfalfa, ladino clover, and red clover. Yields and quality of forage vary from farm to farm and from soil type to soil type. In areas on the steeper slopes and in stony areas, limitations are severe because establishing and maintaining forage plants are difficult. The relative suitability of each soil for forage is discussed in the section "Detailed Soil Map Units."

In older pastures, eliminating the lower-yielding species and establishing a desirable grass-clover mixture can improve the quality and quantity of forage (fig. 11). On the steeper slopes, performing renovation practices in contour strips or using no-till techniques helps to reduce soil loss. Adding clover to a desirable grass sod also can greatly improve the quality of forage, reduce fescue toxicity problems, and reduce the amount of nitrogen fertilizer required.

Maintenance of pasture and hayland.—Applications of fertilizer and lime are needed for the production of pasture and hay on most of the soils in the county because the soils are low in fertility, particularly calcium and phosphorus. The requirements for fertilizer and lime should be based on soil tests, the kind of forage, and the desired yield. Fertilizer and lime should be incorporated into a well-prepared seedbed before planting. After the sod has been established, fertility levels should be maintained by annual topdress applications. For maximum yields, fertilizer should be applied to cool-season plants, such as fescue, orchardgrass, and clover, in spring and fall, shortly before the growing season.

Rotational grazing that uses crossfencing is needed to prevent overgrazing or undergrazing pastures. Grazing plants to shorter than 3 inches greatly reduces the forage production for most species. Undergrazing reduces feeding value, wastes forage, and encourages diseases and insects. Mowing helps to prevent uneven growth, control weeds, and keep plants at a nutritious stage.

Access roads in areas of pastures should be installed on the contour. This practice helps to prevent excessive soil loss and facilitate fertilization and management.

Renovation can increase forage yields in areas that have a good stand of grass. It includes partially destroying the sod, applying lime and fertilizer, and seeding desirable forage species. Adding legumes to the stands of grass provides high-quality feed. Legumes increase summer production and, through symbiotic bacteria, transfer nitrogen from the air into the soil. Under growing conditions, alfalfa can fix 200 to 300 pounds of nitrogen per acre per year; red clover, 100 to 200 pounds; and ladino clover, 100 to 150 pounds. An acre of annual forage legumes, such as Korean lespedeza or vetch, can fix 75 to 100 pounds of nitrogen per year. Warm-season grasses, such as switchgrass, are commonly used to round out forage programs on farms by providing grazing when cool-season forages are dormant.

Additional information on managing pasture and hayland is available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Orchards

According to the North Carolina Cooperative Extension Service, Wilkes County is a leading producer of apples in North Carolina. The county has more than 1,600 acres of apple orchards (fig. 12). Apples are the county's sixth greatest agricultural product. Apple production has been important to the county for more than 150 years. The acreage of apple orchards has somewhat increased during the past 20 years. Peaches and nectarines have also become important crops in recent years. They are grown on more than 400 acres in the county.

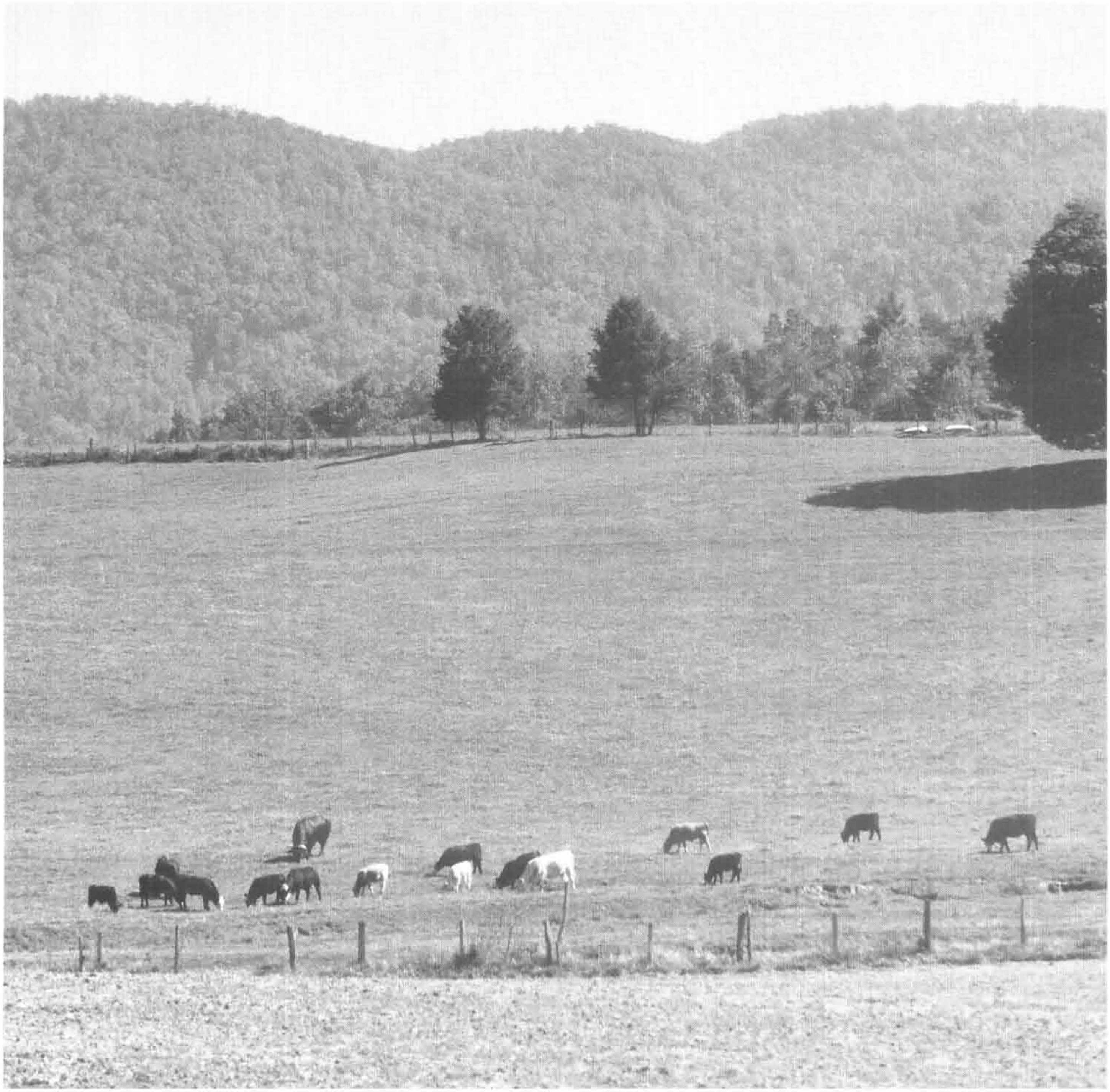

Figure 11.—A large part of Wilkes County is used as pastureland. A well managed grass-clover pasture on Chewacla loam, 0 to 2 percent slopes, frequently flooded, is in the foreground. An area of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded, is in the background.

Apple orchards in the county produce Golden Delicious, Red Delicious, Rome, Stayman, Royal Gala, Limber Twig, and other varieties of apples. The fruit is grown for the fresh market and the juice market. All varieties require intensive management and high maintenance.

Figure 12.—An area of Evard gravelly sandy loam, 6 to 15 percent slopes. This soil is one of the best soils in Wilkes County for producing apples.

Information on soils can help to maintain the production of high-quality apples. Soil factors, such as stoniness, wetness, depth to bedrock, flooding, and slope, affect the production of apples. Climatic factors, such as frost damage and freezing temperatures, also limit apple production and can be related to the landscape position of the soils. Air movement should be considered when selecting a site for apple production. The soils most commonly used for apple production in the county are in the Brushy Mountains. They are Braddock, Hayesville, Evard, Cowee, and Tate soils. Other soils in the county may be suited to apple production, but site conditions and air movement require particular attention.

Site selection.—A uniform and sloping topography allows good air drainage. Sites that are gullied or have ravines or abrupt changes in slope should not be selected. Trees planted in soils that are wet, subject to

flooding, affected by seeps, or in natural drainageways produce low yields and are more susceptible to disease. Orchards should be established near an adequate supply of water, which can be used for spraying or irrigation. Good sites are in areas of very deep, well drained soils.

Layout and erosion control.—The layout of an orchard should include outlets for water flowing into the orchard from higher areas and for water flowing out of the orchard. Field borders and diversions that empty into grassed waterways dispose of water without causing erosion. Sod should be used between rows of trees and on all roads and erosion-control structures. It should be established as soon as possible after construction. Rows of trees should be planted on the contour and as nearly parallel as possible. This arrangement helps to control erosion and allows easy access. Access roads are very important. Short or dead-end roads, which make access with equipment difficult, and roads with sharp turns or grades above 10 percent should not be constructed. Wet areas or natural drainageways should be avoided as sites for roads. If these areas are unavoidable, water bars and culverts should be installed.

Lime, fertilizer, and herbicides.—The soils in Wilkes County do not have sufficient natural fertility to sustain orchards. They are too acid, are typically low in nitrogen and phosphorus, and are high in potassium. Application rates for lime and fertilizer should be determined by tissue analysis of the trees and by soil analysis. Lime and fertilizer should be applied to access roads and erosion-control structures to maintain the sod.

The content of organic matter, the texture of the surface layer, and the depth to a water table affect the amount and frequency of herbicide applications. A high content of organic matter and a high content of clay in the surface layer can inhibit the activity of herbicides. Water from seeps and springs can also reduce the effectiveness of herbicides. These soil limitations are described under the heading "Detailed Soil Map Units."

Ornamental Crops

According to the North Carolina Cooperative Extension Service, nursery and greenhouse crops grown in Wilkes County accounted for 930,000 dollars in 1992. These crops include mountain laurel, rhododendron, hemlock, boxwood, and other species of native trees, shrubs, and herbaceous plants used in landscaping. Also grown are hybrid trees and shrubs, including holly, juniper, and yew. A few areas are used for Christmas trees.

Soil-plant-landscape relationships.—Native and hybrid ornamental crops grow well on well drained, loamy soils. They should be protected from northwest winds in the winter, especially at high elevations. The content of clay in the soil should be between 15 and 30 percent for optimum ball and burlap harvesting.

Site selection.—Soils that have a clay content of less than 15 percent should not be used for ornamental species that are ball and burlap harvested. These soils do not cling together and thus ball poorly. Soils that have a clay content of more than 30 percent can only be dug within a narrow range of water content. Soils that are wet, are in natural drainageways, or have a content of clay of more than 30 percent also should not be used for ornamental crops. They hold excess moisture around roots, which results in poor growth and encourages phytophthora root disease. Soils that have slopes of more than 30 percent should not be used because the slope limits the use of equipment for mowing, spraying, and harvesting. Steep and very steep slopes increase labor costs and the amount of time needed for harvesting and detrimentally affect plant shape. Sites should be selected in areas that have an adequate supply of clear water that can be used for spraying or irrigation. Disturbing as little of the planting area as possible helps to prevent excessive erosion. Areas between plants and areas between rows should remain in permanent sod. Planting in a grid arrangement allows easy access for equipment used for mowing and spraying.

Conifer line-out beds require soils that have less than 10 percent clay in the upper 12 inches. Soils that are more than 10 percent clay hold seedling roots so tightly that tearing and breaking of roots result during harvesting. Root damage reduces the vigor of the seedlings when they are transplanted to a field. Soils that have a sandy surface layer, such as Buncombe soils, are suited to line-out beds.

Access roads should be carefully planned and constructed. If possible, they should not be constructed in natural drainageways, in wet areas, or where, because of the slope, the roadbed grade would be more than 10 percent. They should be surfaced or seeded with perennial vegetation as soon as possible after construction. Lime and fertilizer should be applied regularly to maintain the sod. Cut and fill slopes should be stabilized with vegetation as soon as possible.

Lime, fertilizer, and herbicides.—Because of insufficient natural fertility, the soils in Wilkes County cannot quickly produce ornamentals. They are typically low in nitrogen and phosphorus and high in potassium. Some soils are too acid for ornamental crops, especially for hybrid ornamentals and some tree species. Application rates for lime and fertilizer should be determined by soil tests and by tissue analysis of the crop.

Herbicides should only be applied by banding or spot

treatment. The content of organic matter, the texture of the surface layer, and the depth to a water table affect the amount of herbicide used and the frequency of application. A high content of organic matter and a high content of clay in the surface layer can inhibit the activity of herbicides. Water in soils in areas of seeps and springs can reduce the effectiveness of herbicides. These soil limitations are described under the heading "Detailed Soil Map Units."

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the North Carolina Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(14)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 5.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. Generally, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 8 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 56,700 acres in the survey area, or nearly 12 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the eastern part.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more sloping, more erodible, less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures used to overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Woodland Management and Productivity

Albert Coffey, forester, Natural Resources Conservation Service, helped prepare this section.

Owners of woodland in Wilkes County have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving esthetic values; and providing opportunities for recreational activities, such as commercial hunting. Public demand for clean water and recreational areas creates pressures and opportunities for owners of woodland.

For purposes of forest inventory, the predominant forest types identified in Wilkes County are as described in the following paragraphs *(12).*

Oak-hickory. This forest type covers 186,661 acres. More than 50 percent of the stand consists of upland oaks or hickory, or both. Commonly included trees are yellow-poplar and red maple.

Loblolly-shortleaf. This forest type covers 65,243 acres. It is predominantly loblolly pine, shortleaf pine, or other kinds of southern yellow pine (excluding longleaf pine and slash pine) or a combination of these species.

Pine species make up more than 50 percent of the stand. Loblolly pine is not native to Wilkes County but has been planted in many places. Commonly included trees are red oak, white oak, black gum, hickory, and yellow-poplar.

Oak-pine. This forest type covers 63,937 acres. It is predominantly hardwoods, generally upland oaks. Pine species make up 25 to 50 percent of the stand. Commonly included trees are black gum, hickory, and yellow-poplar.

White pine-hemlock. This forest type covers 25,581 acres. It is more than 50 percent eastern white pine. Commonly included trees are hemlock, birch, and maple.

The landowner interested in timber production is faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and application of silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover about 341,422 acres, or about 70 percent of the land area of Wilkes County *(12)*. Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Eastern white pine and yellow-poplar are the most important timber species in the county because they grow fast, are adapted to the soils and climate, bring a high average sale value per acre, and are easy to establish and manage.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors also are important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of the growing season influence site productivity.

A knowledge of soils helps to provide a basic understanding of the distribution and growth of tree species on the landscape. For example, yellow-poplar grows well on deep or very deep, moist soils and scarlet oak, white oak, or pine is more common where the rooting depth is restricted or the moisture supply is limited.

Availability of water and nutrients and landscape position largely determine which tree species grow on a particular soil. For example, yellow-poplar grows on soils that have the highest fertility levels and a high moisture content. Chestnut oak, scarlet oak, and red maple grow on soils that have low fertility and a low moisture content. Pine grows on soils that have very low fertility and a very low moisture content.

Soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. These three qualities are directly or indirectly affected by organic matter content, reaction, fertility, drainage, texture, structure, depth, and landscape position. Elevation and aspect are of particular importance in mountainous areas.

The ability of a soil to serve as a reservoir for moisture, as measured by the available water capacity, is primarily influenced by texture, organic matter content, rooting depth, and content of rock fragments. Because of the fairly even and abundant summer rainfall in the survey area, available water capacity is a limitation affecting tree growth only in shallow soils, such as Cleveland soils.

Windthrow, or the uprooting of trees by the wind, is a major management concern on shallow soils, such as Cleveland and Saluda soils. These soils are very susceptible to windthrow. Windthrow is a moderate management concern on moderately deep soils, such as Ashe, Bethlehem, Chestnut, Cowee, Hibriten, and Wateree soils. These soils are moderately susceptible

to windthrow. Other soils in the county provide an adequate anchor for tree roots.

The available supply of nutrients for tree growth is affected by several soil properties. Mineral horizons in the soil are important. Mineralization of humus releases nitrogen and other nutrients to plants. Calcium, magnesium, and potassium are held within the humus. Very small amounts of these nutrients are made available by the weathering of clay and silt particles. Most of the soils in the uplands have been leached and contain only small amounts of nutrients below the surface layer. Soils that have a thin surface layer require careful management during site preparation to ensure that the surface layer is not removed or degraded.

The living plant community is part of the nutrient reservoir. The decomposition of leaves, stems, and other organic material recycles the nutrients that have accumulated in the forest ecosystem. Fire, excessive trampling by livestock, and erosion can result in the loss of these nutrients. Woodland management should include prevention of wildfires and protection from overgrazing.

Aspect and landscape position influence the amount of available sunlight, air drainage, soil temperature, and moisture retention. North- and east-facing slopes, or cool slopes, are better suited to tree growth than south- and west-facing slopes, or warm slopes. The average height that trees attain in 50 years can be several feet higher on cool slopes than on warm slopes. The mean annual soil temperature is about 2 degrees F lower on the cool slopes. The difference in temperature is most prevalent during the dormant season. Because less sunlight falls on the canopy in areas of the cool slopes, the air temperature in the canopy and the transpiration rate are lower and less water is needed for plant growth.

Soils on the lower slopes may receive additional water because of internal waterflow. In soils on the very steep uplands, much of the water movement during periods of saturation occurs as lateral flow within the subsoil.

Soil and air temperatures are lower on the upper slopes than on the lower slopes. The temperature decreases by about 1 degree F per 550 feet of increase in elevation. The soils at the base of warm slopes and the soils on the adjacent cool slopes are similar, probably because of the shading effect of the ridge and possibly because of air drainage. These similar soils are mapped together.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in management.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a high content of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and

reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize soil compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, by bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. The predominant common trees are listed in table 7 in the order of their observed occurrence. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on eastern white pine, yellow-poplar, shortleaf pine, chestnut oak, and northern red oak *(5, 7, 8, 10)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as bedding, managing water, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

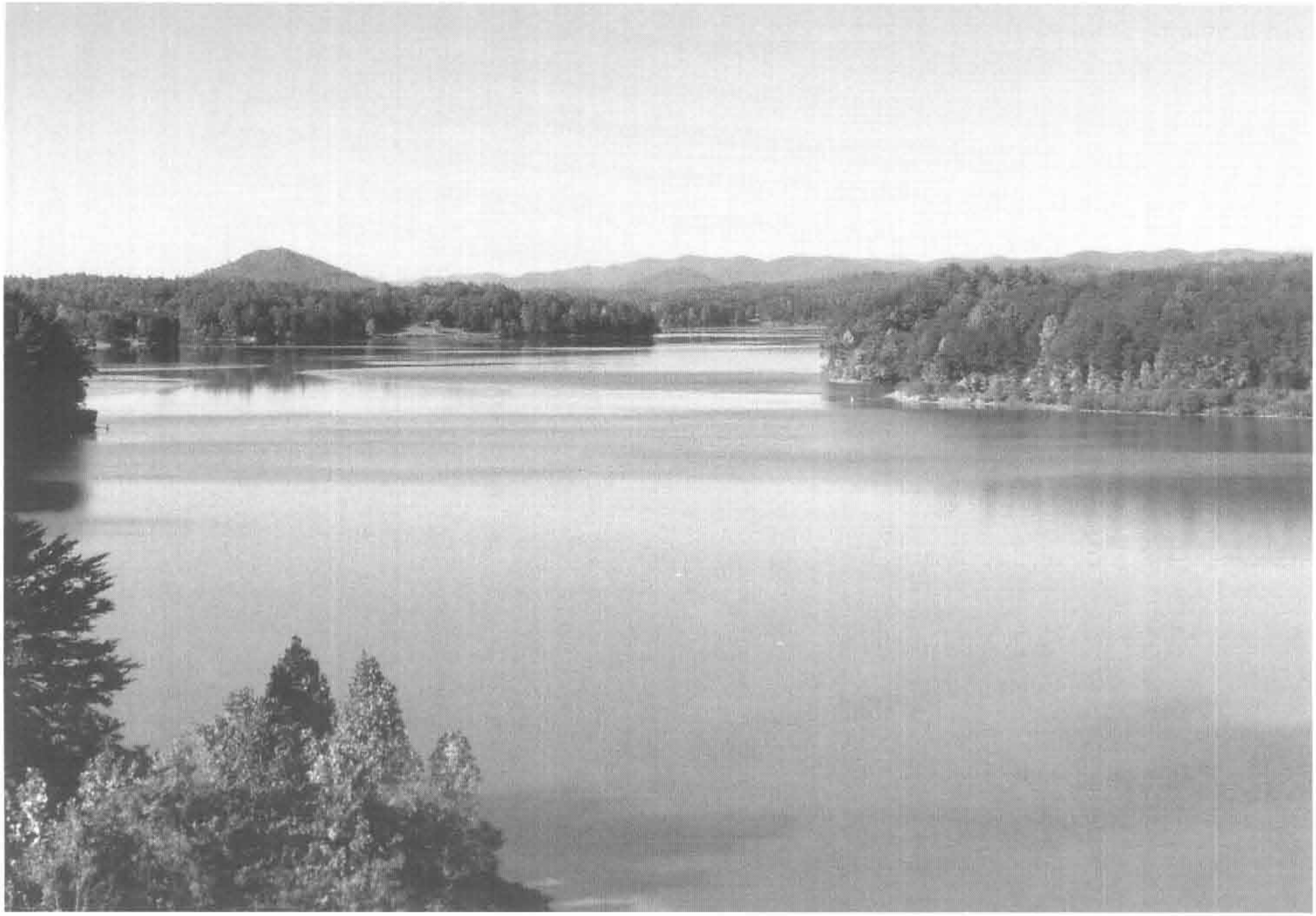

Figure 13.—W. Kerr Scott Lake provides opportunities for many water-related recreational activities, flood protection, water supplies, and natural scenic beauty.

Recreation

Bruce Miller, recreation director, Wilkes County Recreation Department, helped prepare this section.

Wilkes County offers a variety of recreational opportunities. The Wilkes County Recreation Department organizes recreational activities and sports leagues at numerous fields, courts, county parks, and community schools. The county has numerous swimming pools and several golf courses. W. Kerr Scott Lake provides opportunities for fishing, swimming, boating, camping, waterskiing, picnicking, and other activities (fig. 13). The Yadkin River also offers a variety of activities, such as canoeing and fishing. Many local landowners allow hunting on their land and fishing in their farm ponds. Wilkes County has several privately owned campgrounds with playgrounds and facilities for camping, picnicking, hiking, fishing, and swimming.

Wilkes County includes State and Federal lands that allow public access. Trout fishing is popular in Stone Mountain State Park and in many other mountain streams in the county (fig. 14). Stone Mountain is known for its scenic beauty and offers opportunities to rock climb, hike, rappel, or study nature. Doughton Park also offers scenic beauty and opportunities for hiking and picnicking. Thurmond Chatham Gamelands provide access to thousands of acres of land for hunting and wildlife observation. The Blue Ridge Parkway winds through the northern and northwestern parts of the county. It is located on the crest of the Blue Ridge Mountains, overlooking Wilkes County and areas to the south and east. The parkway has elevations of nearly

Figure 14.—Areas of mountain streams in Wilkes County offer scenic beauty and opportunities for hiking, camping, and trout fishing.

4,000 feet in parts of the county. It is also known for its scenic beauty and esthetic value. It draws thousands of tourists to Wilkes County each year.

North Wilkesboro hosts an apple festival. The festival includes arts and crafts, exhibits, apple products, and music and entertainment. The North Wilkesboro Speedway holds major autoraces in Wilkes County in spring and fall each year. The county also has a drag strip and several dirt tracks for racing enthusiasts.

As the demand for public and private recreational facilities increases, a knowledge of soils and soil properties is needed in planning and developing new facilities and in maintaining existing facilities.

The soils of the survey area are rated in table 8 according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil

features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the period of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Donald A. Hayes, wildlife biologist, North Carolina Wildlife Resources Commission, and Albert C. Henry, Jr., biologist, Natural Resources Conservation Service, helped prepare this section.

Wilkes County has an extensive acreage of undeveloped land, much of which is capable of supporting a variety of wildlife species. The most common big game species is the white-tailed deer, which inhabits areas throughout most of the county. Populations of deer have traditionally been high in the northern part of the county and are now increasing throughout the rest of the county. Black bear is occasionally seen, and a small resident population inhabits remote areas, primarily in the northern and western parts of the county. Large private landholdings and tracts owned by various State and Federal government agencies provide a limited amount of the undisturbed habitat necessary for the bear's continued existence.

Wild turkey is another game species in the county. In the past, activities such as market hunting, poaching, and timber cutting methods have eliminated populations of the turkey in Wilkes County and many other counties in northwestern North Carolina. However, efforts to restore populations of this game bird have been successful in many areas (fig. 15). Self-sustaining populations are now found in the northern and western parts of Wilkes County. The North Carolina Wildlife Resources Commission plans additional restoration efforts in the Brushy Mountains in the southern part of the county. This area is currently a top priority for restocking.

Small game and nongame species inhabiting the county include bobwhite quail, cottontail rabbit,

Figure 15.—Wildlife is very abundant in Wilkes County. Recently, portions of the county have been successfully restocked with wild turkey.

mourning dove, gray squirrel, red squirrel, gray fox, red fox, raccoon, groundhog, ruffed grouse, bobcat, opossum, chipmunk, skunk, and numerous nongame birds and mammals. Furbearers, such as mink, muskrat, and beaver, inhabit areas throughout the county. Populations of rabbit and quail have significantly declined during recent years. This trend has been documented throughout the southeastern United States. Numbers of squirrel and dove have remained relatively stable. Beaver populations have expanded into new areas. Although landowners may consider beaver a nuisance, the beaver helps to create valuable habitat for fish, waterfowl, and other animals.

Woodland management is important to many cavity-nesting species, including raccoons, squirrels, owls, and woodpeckers. In addition, most wildlife species depend on mast, such as hickory nuts, acorns, grapes, berries, and fruits, for a portion of their diet. Woodland management practices include leaving a buffer zone of unharvested timber along streams, keeping clearcuts small, leaving one or two den trees per acre uncut, and maintaining some old growth timber for mast production. Prescribed burning under the guidance of the North Carolina Forest Service can also improve habitat for small game. This practice is limited primarily to plantations of loblolly pine.

The potential for waterfowl management in Wilkes County is very limited. W. Kerr Scott Lake and some of the major streams and rivers are used as resting and feeding areas, but waterfowl migration mainly occurs east of Wilkes County. The proper construction, placement, and maintenance of nesting boxes can

greatly enhance conditions for wood duck, which is the only duck that normally nests in the survey area. Protecting wetlands is critical for waterfowl, furbearers, reptiles, amphibians, and many other species because these areas are limited in Wilkes County.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 9 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild

herbaceous plants. Wildlife attracted to these areas include meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that

excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Wilkes County Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the

ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a

moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table within a depth of 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale, siltstone, and weathered granite saprolite, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can

affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, mica, or salts or sodium. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Soils that have a high content of mica, such as Chandler and Watauga soils, are poorly suited to use in the construction of embankments. The problems resulting from the high content of mica include difficulty in compaction, poor trafficability, susceptibility to erosion, and low shear strength. Also, piping commonly is a problem if the soil material is used to impound water.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations influencing wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(16)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a

percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 16, the first letter is for drained areas and the second is for undrained area.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to

5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, *perched* or *apparent;* and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas, and by the North Carolina Department of Transportation and Highway Safety, Materials and Test Unit, Raleigh, North Carolina.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are Unified classification—D 2487 (ASTM); AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); and Specific gravity—T 100 (AASHTO), D 854 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Kanhapludults (*Kan*, meaning 1:1 layer silicate clays, plus *hapl*, meaning minimal horizon development, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Kanhapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey, kaolinitic, thermic Typic Kanhapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. The Pacolet series is classified as clayey, kaolinitic, thermic Typic Kanhapludults.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(17)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(15)* and in "Keys to Soil Taxonomy" *(18)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ashe Series

The Ashe series consists of moderately deep, somewhat excessively drained, moderately rapidly

permeable soils on mountain uplands. These soils formed in material weathered from rocks such as granodiorite, gneiss, and schist. Slopes range from 8 to 90 percent.

Ashe soils are commonly adjacent to Chestnut, Cleveland, Edneyville, Greenlee, and Ostin soils. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. Greenlee and Ostin soils formed from alluvium and colluvium. They have more than 35 percent rock fragments throughout and are in drainageways.

Typical pedon of Ashe gravelly sandy loam in an area of Chestnut-Ashe complex, 25 to 90 percent slopes, very stony; 14 miles north of North Wilkesboro to the community of Joynes, 0.3 mile northwest on Secondary Road 1737, about 3.7 miles north on Secondary Road 1739 to the Stone Mountain parking lot, 0.3 mile south of the parking lot in a wooded area:

A—0 to 4 inches; olive brown (2.5Y 4/4) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent gravel; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw—4 to 25 inches; light olive brown (2.5Y 5/4) sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; about 10 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

C—25 to 35 inches; white (10YR 8/1) granodiorite saprolite of loamy sand; massive; friable; about 10 percent gravel; few fine flakes of mica; strongly acid; clear wavy boundary.

R—35 inches; hard unweathered granodiorite bedrock.

The thickness of the solum and the depth to hard unweathered bedrock range from 20 to 40 inches. Rock fragments are mainly gravel, cobbles, or stones. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 35 percent throughout the Bw and C horizons. The soils range from very strongly acid to moderately acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is loam, sandy loam, or fine sandy loam.

The C horizon is saprolite weathered from felsic rock, such as granodiorite, schist, and gneiss. It is similar in color to the Bw horizon, is multicolored, or is variable in color. Texture in the fine-earth fraction is similar to that of the Bw horizon or is loamy sand.

The Cr horizon, if it occurs, is soft weathered bedrock that can be dug with difficulty with hand tools.

The R horizon is hard unweathered bedrock.

Ashlar Series

The Ashlar series consists of moderately deep, excessively drained, moderately rapidly permeable soils on the Piedmont. These soils formed in residuum of granite and granite gneiss. Slopes range from 15 to 35 percent.

Ashlar soils are commonly adjacent to Pacolet, Rion, Wateree, and Wedowee soils. Pacolet, Rion, and Wedowee soils have a subsoil that is finer textured than that of the Ashlar soils. They do not have bedrock within a depth of 60 inches. Wateree soils have soft weathered bedrock at a depth of 20 to 40 inches.

Typical pedon of Ashlar gravelly sandy loam in an area of Rion-Ashlar complex, 15 to 35 percent slopes, stony; 3.5 miles north of North Wilkesboro on N.C. Highway 18 to Secondary Road 1002, about 9.5 miles north on Secondary Road 1002 to Secondary Road 1736, about 3.2 miles north on Secondary Road 1736 to Secondary Road 1737, about 2.0 miles north on Secondary Road 1737, about 150 feet west of the road in a pasture:

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

A2—3 to 8 inches; pale brown (10YR 6/3) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw—8 to 22 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine roots; about 10 percent gravel; common fine flakes of mica; very strongly acid; clear wavy boundary.

C—22 to 30 inches; yellowish brown (10YR 5/6) coarse sandy loam; massive; friable; about 10 percent gravel; common fine flakes of mica; very strongly acid; abrupt irregular boundary.

R—30 inches; hard unweathered granodiorite bedrock.

The thickness of the solum ranges from 14 to 38 inches. The depth to hard unweathered bedrock ranges from 20 to 40 inches. Rock fragments are mainly gravel, cobbles, or stones of granite, gneiss, and quartz rock. The content of rock fragments ranges from 15 to 35

percent, by volume, in the A horizon and from 2 to 15 percent in the Bw horizon. The C horizon, if it occurs, has 5 to 35 percent rock fragments, by volume. The soils are very strongly acid or strongly acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 2 to 4. Where it has value of 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is sandy loam or fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8. Texture in the fine-earth fraction is sandy loam, coarse sandy loam, or fine sandy loam.

The R horizon is hard unweathered bedrock.

Bethlehem Series

The Bethlehem series consists of moderately deep, well drained, moderately permeable soils on ridgetops and side slopes of the Piedmont. These soils formed in residuum generally derived from rocks such as sillimanite schist, mica gneiss, mica schist, and phyllite schist. Slopes range from 6 to 15 percent.

Bethlehem soils are commonly adjacent to Ashlar, Hibriten, Pacolet, Rion, and Wateree soils. Ashlar, Rion, and Wateree soils have a subsoil that is coarser than that of the Bethlehem soils. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Pacolet and Rion soils do not have bedrock within a depth of 60 inches. Hibriten soils contain more rock fragments in the subsoil than the Bethlehem soils. Wateree soils are on steep and very steep side slopes.

Typical pedon of Bethlehem gravelly sandy loam in an area of Bethlehem-Hibriten complex, 6 to 15 percent slopes; 15 miles northeast of Wilkesboro to the community of Austin, 1.4 miles southeast on Secondary Road 1752, about 0.4 mile northeast on Secondary Road 1925 to a private farm road, 850 feet north on the private road, 20 feet east of the road in a wooded area:

A—0 to 4 inches; dark yellowish brown (10YR 3/4) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 20 percent gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—4 to 10 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 20 percent gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BE—10 to 15 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; about 10 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt—15 to 30 inches; yellowish red (5YR 4/6) clay; weak medium subangular blocky structure; firm; few fine roots; about 10 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cr—30 to 60 inches; soft weathered sillimanite schist that can be dug with difficulty with hand tools.

The thickness of the solum ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 60 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A and E horizons and from 0 to 35 percent in the BE and Bt horizons. It ranges from 15 to 35 percent, by volume, in the BC and C horizons, if they occur. The soils are very strongly acid or strongly acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture in the fine-earth fraction is sandy loam.

The BE horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture in the fine-earth fraction is sandy clay loam or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture in the fine-earth fraction is clay or clay loam.

The C horizon, if it occurs, is multicolored loamy saprolite weathered from sillimanite schist, mica gneiss, mica schist, or phyllite schist in the fine-earth fraction.

The Cr horizon is soft weathered sillimanite schist, mica gneiss, mica schist, or phyllite schist that can be dug with difficulty with hand tools.

Braddock Series

The Braddock series consists of very deep, well drained, moderately permeable soils on mountain stream terraces, foot slopes, and benches. These soils formed in old alluvium and colluvium derived from a mixture of felsic rocks. Slopes range from 2 to 25 percent.

Braddock soils are commonly adjacent to Cowee, Cullowhee, Evard, Hayesville, Reddies, Rosman, Chestnut, Edneyville, and Tate soils. Cowee and Evard soils are in the higher residual landscape positions. Cowee soils have soft weathered bedrock at a depth of

20 to 40 inches. Cowee, Cullowhee, Evard, Reddies, Rosman, and Tate soils have a subsoil that is coarser than that of the Braddock soils. Cullowhee, Reddies, and Rosman soils are commonly in the lower areas in drainageways and on flood plains. Cullowhee soils are somewhat poorly drained. Cullowhee and Reddies soils have contrasting sandy, gravelly, or cobbly strata at a depth of 20 to 40 inches. Hayesville soils are commonly in the higher residual landscape positions, in areas away from the drainageways. Chestnut and Edneyville soils formed from residuum and are on ridgetops and side slopes of the higher mountains. Tate soils do not have red colors in the subsoil.

Typical pedon of Braddock clay loam, 8 to 25 percent slopes, eroded; 14 miles north of North Wilkesboro on N.C. Highway 18 to its intersection with Secondary Road 1728, about 4.7 miles east on Secondary Road 1728, about 2.0 miles northeast on Secondary Road 1730, about 25 feet south of the road in a pasture:

Ap—0 to 6 inches; reddish brown (5YR 4/4) clay loam; moderate medium granular structure; very friable; many fine and medium roots; about 8 percent gravel; few fine flakes of mica; slightly acid; clear smooth boundary.

Bt1—6 to 22 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; common fine roots; about 5 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—22 to 42 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; common fine roots; about 12 percent rounded gravel; few fine flakes of mica; few small black concretions; very strongly acid; gradual wavy boundary.

BC—42 to 60 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; about 10 percent rounded gravel; few fine flakes of mica; common small black concretions; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches or more. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 0 to 15 percent, by volume, in the Ap horizon, the E horizon, and the upper part of the Bt horizon and from 0 to 35 percent in the lower part of the Bt horizon and in the C horizon. The lower part of the Bt horizon and the BC and C horizons commonly contain deposits of cobbles and gravel. The soils are very strongly acid or strongly acid throughout unless limed. The quantity of flakes of mica is few or common in some pedons.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6 to 8, but the value of 3 is limited to individual subhorizons. Texture in the fine-earth fraction is clay, sandy clay, or clay loam.

The BC horizon is similar in color to the Bt horizon. In some pedons it is mottled or streaked in shades of red, yellow, or brown. Texture in the fine-earth fraction is clay loam or sandy clay loam.

The C or 2C horizon, if it occurs, is similar in color to the Bt horizon or is multicolored saprolite. Texture in the fine-earth fraction is highly variable but commonly is loam, clay loam, sandy clay loam, or sandy loam.

Buncombe Series

The Buncombe series consists of very deep, excessively drained, rapidly permeable soils on flood plains on the Piedmont. These soils formed in recently deposited sandy alluvium adjacent to streams. Slopes range from 0 to 6 percent.

Buncombe soils are commonly adjacent to Chewacla, Dogue, Masada, State, and Toccoa soils. These adjacent soils have a subsoil that is finer textured than that of the Buncombe soils. Chewacla soils are somewhat poorly drained, and Dogue soils are moderately well drained. Masada and State soils are on terraces.

Typical pedon of Buncombe loamy sand, 0 to 6 percent slopes, occasionally flooded; 0.3 mile south of the community of Roaring River on Secondary Road 2327, about 100 feet west of the road and 150 feet northwest of a bridge, in a field:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium granular structure; very friable; common fine and medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.

C1—8 to 18 inches; dark yellowish brown (10YR 4/6) loamy sand; massive; very friable; common fine roots; common fine flakes of mica; very strongly acid; clear smooth boundary.

C2—18 to 60 inches; very pale brown (10YR 7/4) and yellowish brown (10YR 5/6) sand that has common lenses of dark yellowish brown (10YR 4/4) loamy sand; massive; very friable; few fine roots; common fine flakes of mica; moderately acid.

The depth to bedrock is greater than 60 inches. Rock fragments, if they occur, are mainly gravel. The content

of rock fragments is less than 15 percent, by volume, throughout the profile. The A horizon and the C horizon to a depth of 40 inches are sand, loamy sand, or loamy fine sand. Below a depth of 40 inches, textures range from sand to loam. The soils range from very strongly acid to moderately acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 4 to 6. Texture is sand, loamy sand, or loamy fine sand.

Chandler Series

The Chandler series consists of very deep, somewhat excessively drained, moderately rapidly permeable soils on mountain side slopes. These soils formed in material weathered from rocks such as mica schist and mica gneiss. Slopes range from 25 to 80 percent.

Chandler soils are commonly adjacent to Ashe, Chestnut, Edneyville, Tate, and Watauga soils. Ashe, Chestnut, Edneyville, and Tate soils do not have micaceous mineralogy. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Tate and Watauga soils have a subsoil that is finer textured than that of the Chandler soils. Tate soils are in colluvial landscape positions. Watauga soils are on ridgetops and the less sloping side slopes.

Typical pedon of Chandler gravelly fine sandy loam, 25 to 80 percent slopes; 20.2 miles northwest of Wilkesboro on N.C. Highway 16, south on a private road 300 feet before the Blue Ridge Parkway, 0.3 mile to a power line, 300 feet east along the power line, 100 feet north of the power line, on a side slope in a wooded area:

A—0 to 6 inches; dark brown (10YR 4/3) gravelly fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 20 percent gravel; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—6 to 24 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 12 percent gravel; many fine flakes of mica; very strongly acid; gradual wavy boundary.

C1—24 to 40 inches; light olive brown (2.5Y 5/6) saprolite of loamy sand; massive; very friable; about 10 percent gravel; many fine flakes of mica; strongly acid; gradual wavy boundary.

C2—40 to 60 inches; multicolored saprolite of loamy sand derived from mica schist and mica gneiss; massive; very friable; many fine flakes of mica; strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 25 percent in the Bw and C horizons. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica ranges from few to many in the A horizon and is many throughout the Bw and C horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Where it has value of 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is loam, sandy loam, or fine sandy loam.

The C horizon is multicolored loamy saprolite derived from mica schist or mica gneiss. Texture in the fine-earth fraction is loam, sandy loam, fine sandy loam, or loamy sand.

Chestnut Series

The Chestnut series consists of moderately deep, well drained, moderately rapidly permeable soils on mountain ridges and side slopes. These soils formed in material weathered from rocks such as gneiss, granodiorite, and schist. Slopes range from 8 to 90 percent.

Chestnut soils are adjacent to Ashe, Cleveland, Edneyville, Tate, Greenlee, and Ostin soils. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Tate, Greenlee, and Ostin soils are in the lower landscape positions in drainageways and on flood plains. Greenlee and Ostin soils have more than 35 percent rock fragments throughout.

Typical pedon of Chestnut gravelly sandy loam in an area of Chestnut-Edneyville complex, 8 to 25 percent slopes, stony; 1.7 miles northwest of McGrady on N.C. Highway 18 to Secondary Road 1729, about 0.4 mile on Secondary Road 1729, about 200 feet southwest on Joshua Ridge Road, 40 feet west of the road, in a wooded area:

A1—0 to 2 inches; dark yellowish brown (10YR 4/4)

gravelly sandy loam; weak fine granular structure; very friable; common medium roots; about 15 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

A2—2 to 10 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak fine granular structure; very friable; common medium roots; about 15 percent gravel; strongly acid; few fine flakes of mica; clear smooth boundary.

Bw—10 to 24 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; friable; few medium roots; about 7 percent gravel; very strongly acid; gradual wavy boundary.

C—24 to 32 inches; yellowish brown (10YR 5/6) sandy loam; massive; very friable; about 12 percent gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Cr—32 to 60 inches; soft weathered gneiss bedrock that can be dug with difficulty with hand tools.

The thickness of the solum ranges from 20 to 39 inches. The depth to soft weathered bedrock ranges from 20 to 40 inches (fig. 16), and the depth to hard unweathered bedrock is greater than 40 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 25 percent throughout the Bw and C horizons. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is few or common.

The A horizon has hue of 7.5YR to 2.5Y, value of 2 to 6, chroma of 1 to 6. Where it has value and chroma of 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, chroma of 3 to 8. Texture in the fine-earth fraction is loam, sandy loam, or fine sandy loam. In some pedons the B horizon has thin subhorizons of sandy clay loam.

The C horizon is multicolored saprolite weathered from granodiorite, gneiss, or schist and has sandy loam, fine sandy loam, or loamy sand textures in the fine-earth fraction.

The Cr horizon is soft weathered bedrock derived from granodiorite, gneiss, or schist. The bedrock can be dug with difficulty with hand tools.

Chewacla Series

The Chewacla series consists of very deep, somewhat poorly drained, moderately permeable soils on nearly level flood plains on the Piedmont. These soils formed in recent alluvium derived from mixed felsic rocks. Slopes range from 0 to 2 percent.

Chewacla soils are commonly adjacent to Buncombe, Toccoa, Dogue, State, Masada, Pacolet, and Rion soils. Buncombe soils have a sandy substratum and are excessively well drained. Toccoa soils have a subsoil that is coarser than that of the Chewacla soils. Toccoa, State, Masada, Pacolet, and Rion soils are well drained. Dogue, Masada, and Pacolet soils have a subsoil that is finer textured than that of the Chewacla soils. Dogue soils are moderately well drained and are on low stream terraces. State soils are on stream terraces. Masada soils are on high stream terraces. Pacolet and Rion soils formed in residuum on uplands.

Typical pedon of Chewacla loam, 0 to 2 percent slopes, frequently flooded; 0.9 mile north of Clingman on Secondary Road 2303, about 0.6 mile west on Secondary Road 2321, about 75 feet north of the road and 700 feet east of a creek, in a field on the flood plain:

A1—0 to 2 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; slightly acid; clear smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) loam; weak medium granular structure; friable; many fine roots; few flakes of mica; slightly acid; clear wavy boundary.

Bw1—8 to 18 inches; light yellowish brown (10YR 6/4) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; common fine faint brown (10YR 5/3) iron depletions and few fine distinct yellowish brown (10YR 5/8) soft masses of iron accumulation; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw2—18 to 30 inches; pale brown (10YR 6/3) loam; weak medium subangular blocky structure; friable; common fine roots; common medium faint light brownish gray (10YR 6/2) iron depletions and common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bw3—30 to 38 inches; pale brown (10YR 6/3) silt loam; weak medium subangular blocky structure; friable; common medium faint light brownish gray (10YR 6/2) iron depletions and common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; few fine roots; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BCg—38 to 50 inches; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; friable; few fine roots; common medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; common fine flakes of mica; moderately acid; gradual wavy boundary.

Cg—50 to 60 inches; light brownish gray (10YR 6/2) silt

loam; massive; friable; few fine roots; common medium distinct yellowish brown (10YR 5/8), common medium distinct brown (10YR 5/3), and few fine distinct brownish yellow (10YR 6/6) masses of iron accumulation; few fine flakes of mica; moderately acid.

The thickness of the solum ranges from 20 to 60 inches. The depth to bedrock is greater than 60 inches. Rock fragments, if they occur, are mainly gravel. The content of rock fragments ranges from 0 to 5 percent, by volume, in the A horizon and the upper part of the B horizon and is as much as 15 percent in the lower part of the B horizon. The soils range from very strongly acid to slightly acid to a depth of 40 inches and from very strongly acid to neutral below that depth. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4.

The upper part of the Bw horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 8. Iron depletions with chroma of 2 or less are within a depth of 24 inches. Iron accumulations with higher chroma may also occur. Texture generally is loam, sandy loam, fine sandy loam, sandy clay loam, or clay loam. Individual subhorizons may be silt loam or silty clay loam.

The Bg horizon, if it occurs, has hue of 10YR or 2.5Y or is neutral in hue and has value of 4 to 7 and chroma of 1 or 2. Iron accumulations with higher chroma may also occur. The horizon has the same textures as the Bw horizon. The BC and BCg horizons, if they occur, are similar in color and texture to the Bw and Bg horizons, respectively.

The Cg horizon is similar in color to the Bg horizon. It is loamy where it occurs within a depth of 40 inches. Below a depth of 40 inches, the horizon varies in texture but commonly has textures similar to those of the Bg horizon and may contain gravel in stratified layers.

Cleveland Series

The Cleveland series consists of shallow, somewhat excessively drained, moderately rapidly permeable soils in areas closely associated with rock outcrops occurring throughout the steeper mountain uplands. These soils formed generally from rocks such as gneiss and granodiorite. Slopes range from 8 to 90 percent.

Cleveland soils are commonly adjacent to Ashe, Chestnut, Edneyville, Greenlee, and Ostin soils. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils have bedrock below a depth of 60 inches. Greenlee and Ostin soils formed from colluvium in drainageways and on toe slopes. They have more than 35 percent rock fragments throughout.

Typical pedon of Cleveland gravelly sandy loam in an area of Cleveland-Rock outcrop complex, 8 to 90 percent slopes; 14 miles north of North Wilkesboro on North Carolina Highway 18 to Secondary Road 1728, about 2.0 miles east on Secondary Road 1728 to Game Land Road, 1.5 miles north on Osborne Ridge Road to Knob Road, 0.3 mile south on Knob Road, 250 feet west of Knob Road in a wooded area:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 20 percent gravel; few fine flakes mica; strongly acid; gradual wavy boundary.

Bw—4 to 14 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; very strongly acid; clear abrupt boundary.

R—14 inches; hard unweathered gneiss bedrock.

The thickness of the solum and the depth to hard unweathered bedrock range from 10 to 20 inches (fig. 17). Rock fragments are mainly gravel, cobbles, or stones. The content of rock fragments ranges from 15 to 35 percent, by volume, throughout the profile. The soils range from very strongly acid to moderately acid. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 4.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is loam, sandy loam, or fine sandy loam.

The C horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4 or is multicolored. It has textures similar to those of the Bw horizon.

The R horizon is hard unweathered bedrock.

Cowee Series

The Cowee series consists of moderately deep, well drained, moderately permeable soils on ridges and side slopes of the lower mountains. These soils formed in material weathered from granite, gneiss, and schist (fig. 18). Slopes range from 8 to 60 percent.

Cowee soils are commonly adjacent to Evard, Saluda, Hayesville, Braddock, Tate, Reddies, Rosman, and Cullowhee soils. Braddock, Cullowhee, Evard, Hayesville, Reddies, Rosman, and Tate soils do not

have bedrock within a depth of 60 inches. Saluda soils have soft weathered bedrock at a depth of 10 to 20 inches. Hayesville and Braddock soils have a subsoil that is finer textured than that of the Cowee soils. Braddock and Tate soils formed in colluvium and old alluvium. Braddock soils are on foot slopes and high stream terraces. Tate soils are on stream terraces. Reddies, Rosman, and Cullowhee soils are on flood plains and formed in alluvium. Reddies and Rosman soils have a subsoil that is coarser than that of the Cowee soils. Cullowhee soils are somewhat poorly drained. They have contrasting sandy, gravelly, or cobbly strata at a depth of 20 to 40 inches.

Typical pedon of Cowee gravelly sandy loam in an area of Cowee-Saluda complex, 25 to 60 percent slopes, stony; 8 miles south of Wilkesboro on Secondary Road 1001 to Old Gilreath, 1.7 miles south on Secondary Road 2480, about 2,000 feet west on a private road to a power line, 100 feet south of the road and 100 feet east of the power line, in a wooded area:

A—0 to 6 inches; dark brown (10YR 4/3) gravelly sandy loam; weak medium granular structure; very friable; common medium and coarse roots; about 20 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—6 to 12 inches; strong brown (7.5YR 4/6) gravelly sandy loam; weak medium granular structure; very friable; common medium and coarse roots; about 15 percent gravel; few fine flakes of mica; moderately acid; clear wavy boundary.

Bt—12 to 30 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common medium roots; about 10 percent gravel; few fine flakes of mica; moderately acid; abrupt wavy boundary.

Cr—30 to 60 inches; soft weathered gneiss bedrock that can be dug with difficulty with hand tools.

The thickness of the solum ranges from 15 to 39 inches. The depth to soft weathered bedrock ranges from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A and E horizons and from 5 to 35 percent in the BA and Bt horizons and in the BC and C horizons, if they occur. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8. Where it has value of 3, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. Texture in the fine-earth fraction is loam, sandy loam, or fine sandy loam.

The BA horizon, if it occurs, has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It commonly has textures similar to those of the E horizon and, in moderately eroded pedons, may also be sandy clay loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 5YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is sandy clay loam, clay loam, or loam.

The BC horizon, if it occurs, generally has colors and textures similar to those of the Bt horizon. It can have hue ranging to 7.5YR. Textures in the fine-earth fraction may also include fine sandy loam, sandy loam, or loam.

The C horizon, if it occurs, is multicolored saprolite that has a texture in the fine-earth fraction of sandy loam, fine sandy loam, or loam.

The Cr horizon is soft weathered bedrock that can be dug with difficulty with hand tools.

Cullasaja Series

The Cullasaja series consists of very deep, well drained, moderately rapid permeable soils that occur in narrow coves of the Blue Ridge escarpment. These soils formed in colluvium derived from rocks such as granite and gneiss. Slopes range from 15 to 60 percent.

Cullasaja soils are adjacent to Chestnut, Ashe, Cleveland, and Edneyville soils. These adjacent soils formed from residuum. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. Edneyville soils do not have bedrock within a depth of 60 inches.

Typical pedon of Cullasaja very cobbly sandy loam, 15 to 60 percent slopes, extremely bouldery; 20.3 miles north of North Wilkesboro on N.C. Highway 16 to the Blue Ridge Parkway, 3 miles west on the Blue Ridge Parkway to Secondary Road 1360, about 1 mile south on Secondary Road 1360, north of Secondary Road 1360 in a road cut in a wooded drainageway:

A1—0 to 10 inches; very dark brown (10YR 2/2) very cobbly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 40 percent stones, cobbles, and gravel; few fine flakes of mica; strongly acid; gradual smooth boundary.

A2—10 to 14 inches; dark brown (10YR 3/3) very cobbly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 40 percent stones, cobbles, and gravel; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bw—14 to 38 inches; dark yellowish brown (10YR 4/4) very cobbly loam; weak medium subangular blocky structure; very friable; few fine roots; about 40 percent stones, cobbles, and gravel; few fine flakes of mica; very strongly acid; gradual irregular boundary.

C—38 to 60 inches; dark yellowish brown (10YR 4/4) very cobbly loam; massive; very friable; about 50 percent stones, cobbles, and gravel; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to hard unweathered bedrock is greater than 60 inches. Rock fragments are mainly gravel, cobbles, stones, or boulders. The content of rock fragments ranges from 35 to 60 percent, by volume, in the A horizon and the upper part of the Bw horizon and averages 35 to 80 percent in the particle-size control section. The soils range from very strongly acid to moderately acid. The quantity of flakes of mica is few or common.

The A horizon has hue of 10YR and value and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is loam, fine sandy loam, or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is sandy loam, loam, or loamy sand.

Cullowhee Series

The Cullowhee series consists of very deep, somewhat poorly drained, moderately rapidly permeable soils on flood plains along streams underlain by contrasting sandy, gravelly, or cobbly strata in the mountains (fig. 19). These soils formed in recent alluvium derived from mixed felsic rocks. Slopes range from 0 to 3 percent.

Cullowhee soils are commonly adjacent to Tate, Braddock, Evard, Cowee, Saluda, Reddies, Rosman, and Ostin soils. Tate soils are well drained and on stream terraces and toe slopes. Braddock, Evard, Cowee, and Saluda soils have a subsoil that is finer textured than that of the Cullowhee soils. Braddock soils are on toe slopes. Evard, Cowee, and Saluda soils are on upland side slopes and ridgetops and formed in residuum. Reddies soils are moderately well drained. Rosman soils do not have contrasting sandy, gravelly, or cobbly strata within a depth of 40 inches. Ostin soils have gravelly or cobbly strata within a depth of 20 inches and are well drained.

Typical pedon of Cullowhee fine sandy loam, 0 to 3 percent slopes, frequently flooded; 14 miles north of North Wilkesboro on N.C. Highway 18 to Secondary Road 1728, about 4.7 miles east on Secondary Road 1728, about 3.0 miles northeast on Secondary Road 1730 to Lovelace Creek, 200 feet southeast in a field:

A—0 to 12 inches; dark brown (10YR 3/3) fine sandy loam; weak medium granular structure; very friable; many fine roots; about 8 percent gravel; few fine flakes of mica; strongly acid; clear smooth boundary.

C—12 to 20 inches; brown (10YR 4/3) fine sandy loam; massive; very friable; few fine roots; about 10 percent gravel; common medium faint dark grayish brown (10YR 4/2) iron depletions; common medium faint dark yellowish brown (10YR 3/4) and few medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; few fine flakes of mica; strongly acid; clear wavy boundary.

Cg1—20 to 31 inches; dark grayish brown (10YR 4/2) sandy loam; massive; very friable; few fine roots; about 10 percent gravel; common medium distinct dark brown (7.5YR 4/4) masses of iron accumulation; few fine flakes of mica; very strongly acid; clear wavy boundary.

Cg2—31 to 60 inches; dark gray (10YR 4/1) extremely gravelly sand; massive; loose; about 70 percent gravel; few medium distinct dark brown (7.5YR 3/4) masses of iron accumulation; few fine flakes of mica; very strongly acid.

The solum is 12 to 35 inches thick over stratified layers of sand, gravel, or cobbles. Rock fragments are mainly gravel or cobbles. Strata containing more than 35 percent, by volume, rock fragments are at depths between 20 and 40 inches. The depth to bedrock is greater than 60 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon, ranges from 0 to 35 percent in the C horizon, and is greater than 35 percent in the lower part of the Cg horizon. The soils range from very strongly acid to slightly acid. The quantity of flakes of mica is few or common throughout the profile.

The A horizon or the Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have a recently deposited thin layer of loamy or sandy overwash.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Iron depletions with chroma of 2 or less are within a depth of 20 inches. Typically, masses of iron accumulation with chroma brighter than the matrix color also occur. Texture in the fine-earth fraction is sandy loam, fine sandy loam, loam, loamy sand, or sand.

The Cg horizon has hue of 10YR or 2.5YR, value 4 to 6, and chroma of 1 or 2. Masses of iron accumulation may occur. The upper part of the horizon has the same

textures as the C horizon. The lower part is sand to coarse sand in the fine-earth fraction.

Dogue Series

The Dogue series consists of very deep, moderately well drained, moderately slowly permeable soils that formed in old alluvium on low stream terraces on the Piedmont. Slopes range from 1 to 6 percent.

Dogue soils are commonly adjacent to Chewacla, Toccoa, Masada, Rion, Pacolet, and State soils. Chewacla, Toccoa, and State soils have a subsoil that is coarser than that of the Dogue soils. Chewacla soils are on flood plains and are somewhat poorly drained. Toccoa soils are on flood plains and are well drained. Masada and State soils are on high stream terraces and are well drained. Masada soils have a yellow to red, mainly clayey subsoil. Rion and Pacolet soils are on upland side slopes and are well drained. Rion soils have a loamy subsoil. Pacolet soils have a red, predominantly clayey subsoil.

Typical pedon of Dogue fine sandy loam, 1 to 6 percent slopes, rarely flooded; 14 miles east of Wilkesboro on U.S. Highway 268 to Ronda, 0.3 mile south on Secondary Road 2303, about 0.9 mile east on Secondary Road 2304, about 350 feet southeast of the road in a pasture:

A—0 to 2 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

E—2 to 8 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt1—8 to 22 inches; brownish yellow (10YR 6/6) clay loam; weak medium subangular blocky structure; firm; common fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—22 to 37 inches; brownish yellow (10YR 6/6) clay; weak medium subangular blocky structure; firm; few fine roots; moderate medium prominent red (2.5YR 5/8) masses of iron accumulation and common coarse distinct light gray (2.5Y 7/2) iron depletions; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg—37 to 45 inches; light gray (2.5Y 7/2) clay; weak coarse subangular blocky structure; firm; few fine roots; common medium prominent strong brown (7.5YR 5/8) and common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BCg—45 to 52 inches; light gray (N 7/0) clay loam; weak coarse subangular blocky structure; firm; common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; few fine flakes of mica; small pockets or thin layers of sandy loam; very strongly acid.

Cg—52 to 60 inches; light gray (N 7/0) sandy clay loam; massive; friable; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches or more. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A and B horizons and from 0 to 25 percent in the C horizon. The soils are very strongly acid or strongly acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. Texture is loam, fine sandy loam, or sandy loam.

The BA horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The upper part of the Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The lower part has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8, or it has a pattern of colors without a dominant matrix color. Iron depletions with chroma of 2 or less are within 24 inches of the upper boundary of the Bt horizon. Masses of iron accumulation that have colors brighter than the matrix color may also occur. Texture is dominantly clay loam, clay, or sandy clay. Some subhorizons may be sandy clay loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 or less. Masses of iron accumulation typically occur. The horizon has the same textures as the Bt horizon.

The BCg horizon has colors similar to those of the lower part of the Btg horizon. Texture is sandy loam, sandy clay loam, or clay loam.

The Cg horizon has colors similar to those of the Btg horizon. Texture in the fine-earth fraction ranges from sand to sandy clay loam.

Edneytown Series

The Edneytown series consists of very deep, well drained, moderately permeable soils on ridgetops of the lower mountain uplands. These soils formed in material weathered from granodiorite. Slopes range from 8 to 25 percent.

Edneytown soils are commonly adjacent to Chestnut, Ashe, Cleveland, and Edneyville soils. These adjacent

soils have a subsoil that is coarser than that of the Edneytown soils. They are on ridgetops and side slopes. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. Edneyville soils are on ridgetops and side slopes and do not have bedrock within a depth of 60 inches.

Typical pedon of Edneytown gravelly sandy loam, 8 to 25 percent slopes; 14 miles northeast of North Wilkesboro to the community of Joynes, 0.3 mile northwest on Secondary Road 1737, about 0.5 mile north on Secondary Road 1739, about 1,400 feet north-northwest on an old logging road, 30 feet east in a wooded area:

A—0 to 8 inches; pale brown (10YR 6/3) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 20 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt1—8 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; about 12 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—20 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; common fine distinct yellowish red (5YR 5/8) and common fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; about 10 percent gravel; common medium flakes of mica; very strongly acid; clear wavy boundary.

BC—30 to 39 inches; strong brown (7.5YR 5/8) sandy clay loam; common fine distinct reddish yellow (5YR 6/8) mottles; weak medium subangular blocky structure; friable; common medium roots; about 10 percent gravel; common medium flakes of mica; very strongly acid; gradual wavy boundary.

C1—39 to 54 inches; reddish yellow (7.5YR 6/6) sandy loam; massive; friable; about 10 percent gravel; common medium flakes of mica; very strongly acid; clear smooth boundary.

C2—54 to 60 inches; white (10YR 8/2) granodiorite saprolite of loamy sand; massive; very friable; about 12 percent gravel; common medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and the E horizon, if it occurs. It ranges from 5 to 15 percent, by volume, throughout the Bt, BC, and C horizons. The soils range from very strongly acid to moderately acid in the A horizon and the E horizon, if it occurs, and are very strongly acid or strongly acid in the B and C horizons and their transitional horizons. The quantity of flakes of mica is few or common.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 4.

The E horizon, if it occurs, has hue of 10YR, value of 4 to 7, and chroma of 3 to 6. Texture in the fine-earth fraction is loamy fine sand, fine sandy loam, or sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. Texture is fine sandy loam, sandy clay loam, or clay loam.

The BC horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 6 to 8. Texture is sandy loam or sandy clay loam.

The C horizon is granodiorite saprolite. It has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8 or is in shades of white, red, or brown. Texture is fine sandy loam, loamy sand, or sandy loam.

Edneyville Series

The Edneyville series consists of very deep, well drained, moderately rapid permeable soils on mountain ridges and side slopes. These soils formed from rocks such as gneiss, schist, and granodiorite. Slopes range from 8 to 60 percent.

Edneyville soils are adjacent to Ashe, Cleveland, Chestnut, Reddies, Rosman, and Tate soils. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Reddies, Rosman, and Tate soils are in the lower landscape positions in drainageways and on flood plains.

Typical pedon of Edneyville gravelly sandy loam in an area of Chestnut-Edneyville complex, 25 to 60 percent slopes, stony; 20 miles northeast of Wilkesboro to the community of Thurmond, 4.9 miles north on U.S. Highway 21 (1,000 feet before the Alleghany County line), 1,000 feet southwest of U.S. Highway 21, on the south side of a ridge on a side slope:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; moderately acid; clear smooth boundary.

A2—2 to 5 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of

mica; moderately acid; gradual wavy boundary.

Bw—5 to 18 inches; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; few fine roots; about 7 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—18 to 27 inches; brown (7.5YR 5/4) loam; common medium distinct yellowish brown (10YR 5/6) and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; about 10 percent gravel; few fine flakes of mica; strongly acid; gradual irregular boundary.

C1—27 to 42 inches; yellowish brown (10YR 5/6) sandy loam; common medium faint brownish yellow (10YR 6/6) mottles; massive; very friable; about 12 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

C2—42 to 60 inches; pale brown (10YR 6/3) saprolite of loamy sand; massive; very friable; about 12 percent gravel; few fine flakes of mica; moderately acid.

The thickness of the solum ranges from 20 to 50 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon, from 5 to 15 percent in the Bw horizon, and from 5 to 35 percent in the BC and C horizons. The soils range from very strongly acid to moderately acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Where it has value of 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. Texture is loam, sandy loam, or fine sandy loam.

The BC horizon, if it occurs, has colors and textures similar to those of the Bw horizon in the fine-earth fraction.

The C horizon is saprolite that is similar in color to the Bw horizon or is multicolored. Texture in the fine-earth fraction is loam, sandy loam, loamy sand, or fine sandy loam.

Evard Series

The Evard series consists of very deep, well drained, moderately permeable soils on ridges and side slopes of the lower mountains. These soils formed in material weathered from rocks such as granite, gneiss, and schist. Slopes range from 6 to 60 percent.

Evard soils are commonly adjacent to Cowee, Saluda, Hayesville, Braddock, Tate, Reddies, Rosman, and Cullowhee soils. Cowee, Saluda, and Hayesville soils are on ridgetops and side slopes. Cowee soils have soft weathered bedrock at a depth of 20 to 40 inches. Saluda soils have soft weathered bedrock at a depth of 10 to 20 inches. Hayesville and Braddock soils have a subsoil that is finer textured than that of the Evard soils. Hayesville soils are on ridgetops. Braddock and Tate soils formed in colluvium and old alluvium. Braddock soils are on foot slopes and high stream terraces. Tate soils are on stream terraces. Reddies, Rosman, and Cullowhee soils have a subsoil that is coarser than that of the Evard soils. They are on flood plains and formed in alluvium. Cullowhee soils are somewhat poorly drained.

Typical pedon of Evard gravelly sandy loam in an area of Evard-Cowee complex, 25 to 60 percent slopes, stony; 12 miles south of Wilkesboro on Secondary Road 1001 to Secondary Road 2482, about 0.5 mile west on Secondary Road 2482, about 10 feet north of the road on a side slope, in a wooded area:

A—0 to 2 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—2 to 8 inches; yellowish brown (10YR 5/6) gravelly sandy loam; moderate medium granular structure; very friable; common fine and medium roots; about 15 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt—8 to 26 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; about 7 percent gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—26 to 36 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; very friable; few fine roots; about 10 percent gravel; common fine flakes of mica; very strongly acid; gradual irregular boundary.

C—36 to 60 inches; strong brown (7.5YR 5/8) saprolite of sandy loam; massive; friable; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches or more. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A and E horizons and from 2 to 15 percent in the Bt horizon. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is few or common in the A, E, and Bt horizons and ranges from few to many in the BC and C horizons.

The A or Ap horizon has hue of 5YR to 10YR, value

of 3 to 5, and chroma of 3 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is sandy loam, fine sandy loam, or loam.

The BA or BE horizon, if it occurs, has hue of 2.5YR to 7.5YR and value and chroma of 4 to 8. Texture is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is sandy clay loam or clay loam.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. Texture is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam.

The C horizon is saprolite weathered from granite, gneiss, or schist. It commonly has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 to 8 or is multicolored. Texture is sandy loam, fine sandy loam, loam, loamy fine sand, or loamy sand.

Greenlee Series

The Greenlee series consists of very deep, well drained, moderately rapidly permeable soils on foot slopes, in coves, and on benches of the Blue Ridge escarpment. These soils formed in colluvium derived from rocks such as gneiss and granodiorite (fig. 20). Slopes range from 6 to 40 percent.

Greenlee soils are commonly adjacent to Ostin, Chestnut, Edneyville, Ashe, and Cleveland soils. Ostin soils are in low areas adjacent to stream channels. They do not have the larger rock fragments. Chestnut, Edneyville, Ashe, and Cleveland soils formed in residuum. They are on ridgetops and side slopes. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches.

Typical pedon of Greenlee very cobbly sandy loam in an area of Greenlee-Ostin complex, 3 to 40 percent slopes, very stony; 16 miles north of North Wilkesboro on N.C. Highway 18 to Secondary Road 1729, about 0.3 mile north on Secondary Road 1729 to Joshua Ridge Road, 1.4 miles east on Joshua Ridge Road to Joshua Creek, in a road cut:

A1—0 to 4 inches; dark brown (10YR 3/3) very cobbly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 40 percent cobbles and gravel; few fine flakes of mica; moderately acid; clear smooth boundary.

A2—4 to 8 inches; brown (10YR 4/3) very cobbly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 40 percent cobbles and gravel; few fine flakes of mica; moderately acid; clear wavy boundary.

Bw—8 to 40 inches; yellowish brown (10YR 5/8) very cobbly sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; about 50 percent cobbles and gravel; few fine flakes of mica; very strongly acid; gradual irregular boundary.

C—40 to 60 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; massive; very friable; few fine flakes of mica; about 50 percent stones and cobbles; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 60 inches or more. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel, cobbles, stones, or boulders. The content of rock fragments ranges from 35 to 60 percent, by volume, in the A and Bw horizons and from 35 to 80 percent in the C horizon. The soils range from very strongly acid to moderately acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 4. Where it has value of 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Texture in the fine-earth fraction is dominantly loam, fine sandy loam, or sandy loam. Some pedons have a thin layer of sandy clay loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is dominantly loam, fine sandy loam, or sandy loam. Some pedons have a thin layer of sandy clay loam in the fine-earth fraction.

The BC horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 4 to 6. Texture in the fine-earth fraction is loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is loam, fine sandy loam, sandy loam, loamy sand, or sand.

Hayesville Series

The Hayesville series consists of very deep, well drained, moderately permeable soils on ridges of the lower mountains. These soils formed in material weathered from rocks such as granite, gneiss, and schist. Slopes range from 6 to 15 percent.

Hayesville soils are commonly adjacent to Braddock,

Evard, Cowee, Saluda, Tate, Cullowhee, Reddies, and Rosman soils. Braddock soils formed in colluvium and old alluvium on foot slopes and high terraces. Evard, Cowee, Saluda, Tate, and Rosman soils have a subsoil that is coarser than that of the Hayesville soils. Evard, Cowee, and Saluda soils formed in residuum on ridgetops and side slopes. Tate soils are on stream terraces and do not have red colors. Cullowhee and Reddies soils have contrasting sandy, gravelly, or cobbly strata at a depth of 20 to 40 inches. Cullowhee soils are somewhat poorly drained. Cullowhee, Reddies, and Rosman soils are on flood plains.

Typical pedon of Hayesville sandy clay loam, 6 to 15 percent slopes, eroded; 10.1 miles northwest of Wilkesboro on N.C. Highway 16, about 2.3 miles north on Secondary Road 1559, about 5.1 miles east-northeast on Secondary Road 1570, about 600 feet southwest of the road on a ridge:

Ap—0 to 8 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium granular structure; very friable; many fine roots; about 11 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt—8 to 40 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; common fine roots; about 6 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—40 to 58 inches; red (2.5YR 4/6) clay loam; few fine distinct reddish yellow (5YR 7/6) mottles; weak medium subangular blocky structure; friable; few fine roots; about 8 percent gravel; few fine flakes of mica; very strongly acid; gradual irregular boundary.

C—58 to 60 inches; red (2.5YR 5/6) loam; few fine prominent yellowish red (5YR 5/8) mottles; about 8 percent gravel; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 0 to 15 percent, by volume, throughout the profile. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture is loam, fine sandy loam, or sandy loam.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay or clay loam.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is similar in color to the Bt horizon. Texture is clay loam, sandy clay loam, or loam.

The C horizon is saprolite weathered from granite, gneiss, or schist. It has colors similar to those of the BC horizon or is multicolored. Texture is sandy clay loam, loam, or sandy loam.

Hibriten Series

The Hibriten series consists of moderately deep, well drained, moderately permeable soils that formed in material weathered from rocks such as mica schist, sillimanite schist, and mica gneiss. Slopes range from 6 to 45 percent.

Hibriten soils are commonly adjacent to Bethlehem, Pacolet, Rion, and Chewacla soils. These adjacent soils have fewer rock fragments than the Hibriten soils. Bethlehem, Pacolet, and Rion soils are on ridgetops and side slopes. Bethlehem and Pacolet soils have a subsoil that is finer textured than that of the Hibriten soils. Pacolet, Rion, and Chewacla soils do not have bedrock within a depth of 60 inches. Chewacla soils are on flood plains and are somewhat poorly drained.

Typical pedon of Hibriten very cobbly sandy loam, 15 to 45 percent slopes; 15 miles northeast of Wilkesboro to the community of Austin, 1.4 miles southeast on Secondary Road 1752, about 0.4 mile northeast on Secondary Road 1925, about 800 feet north on a private farm road, 1,000 feet east along a power line, 100 feet north on a side slope in a wooded area:

A—0 to 4 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak coarse granular structure; very friable; common fine and medium roots; about 40 percent cobbles and gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—4 to 12 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; weak coarse granular structure; very friable; common fine and medium roots; about 40 percent cobbles and gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—12 to 30 inches; reddish yellow (7.5YR 6/6) very cobbly sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 40 percent cobbles and gravel; few fine flakes of mica; very strongly acid; abrupt irregular boundary.

Cr—30 to 60 inches; soft weathered sillimanite schist that can be dug with difficulty with hand tools.

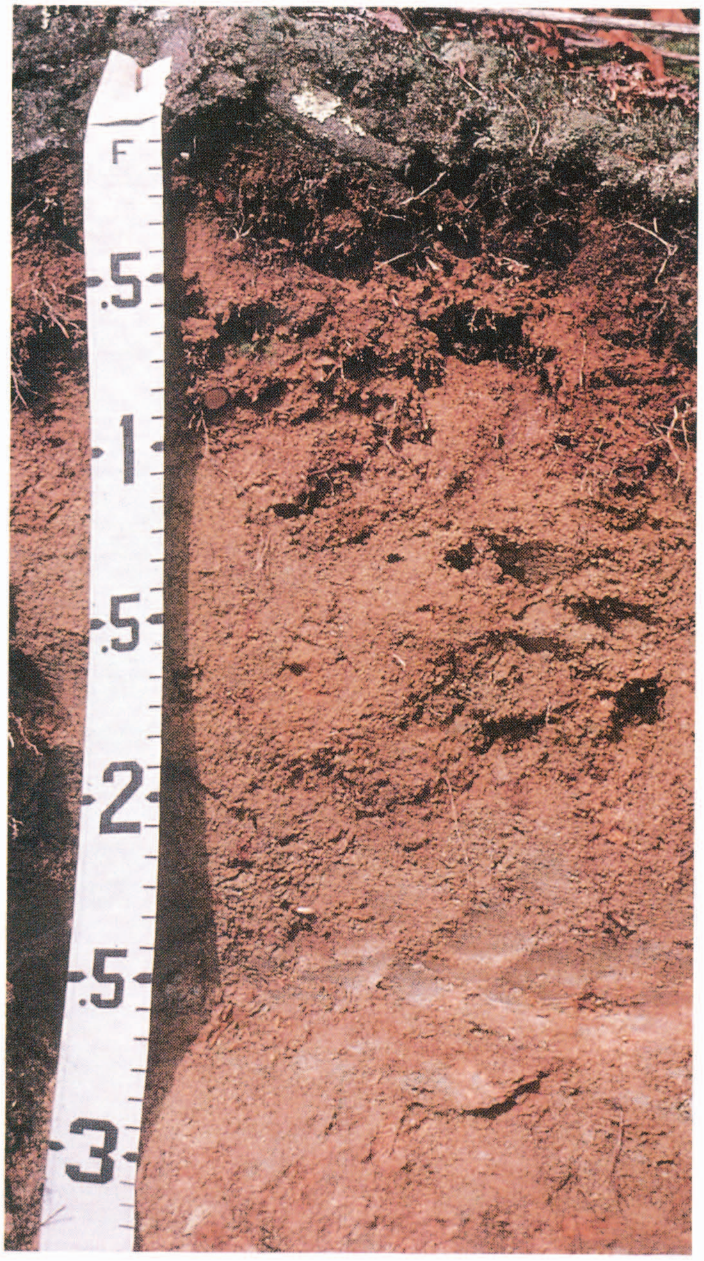

Figure 16.—A profile of Chestnut gravelly sandy loam. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. The scale is in feet.

Figure 17.—A profile of Cleveland gravelly sandy loam. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches. The scale is in feet.

Figure 18.—A profile of Cowee gravelly sandy loam. Cowee soils formed in place from soft weathered materials that can be dug with difficulty with hand tools. The scale is in feet.

Figure 19.—A profile of Cullowhee fine sandy loam. Cullowhee soils are along flood plains of low-lying streams. They contain contrasting sandy, gravelly, or cobbly strata. The scale is in feet.

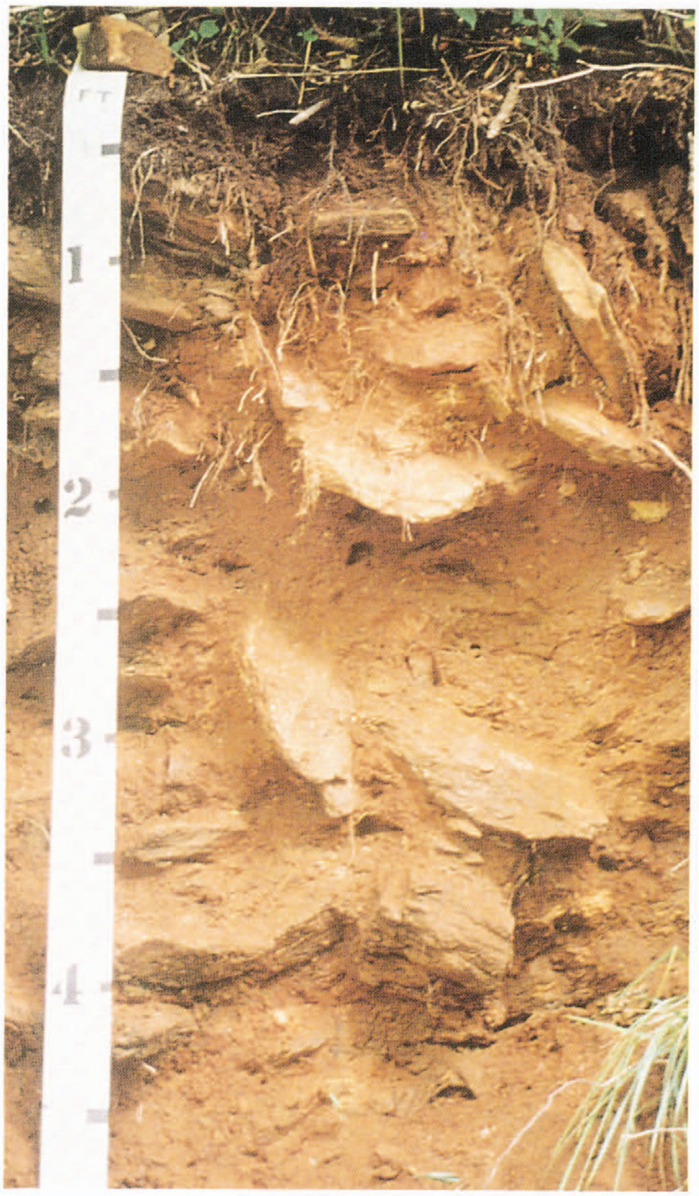

Figure 20.—A profile of Greenlee very cobbly sandy loam. Greenlee soils formed from materials that have moved slowly downslope. They are along foot slopes, in coves, and on benches of the Blue Ridge escarpment. The scale is in feet.

Figure 21.—A profile of Ostin very cobbly loamy sand. Ostin soils are along fast-flowing streams in the mountains. They formed in stratified layers of sand, gravel, and cobbles. The scale is in feet.

Figure 22.—A profile of Pacolet sandy clay loam. Pacolet soils are very deep and have a red subsoil that extends to a depth of about 20 to 40 inches. Multicolored saprolite is below a depth of 40 inches. The scale is in feet.

Figure 23.—A profile of Tate fine sandy loam. Tate soils have a loamy subsoil that extends to a depth of more than 30 inches. Bedrock is below a depth of 60 inches. The scale is in feet.

The thickness of the solum and the depth to soft weathered bedrock range from 20 to 40 inches. The depth to hard unweathered bedrock is greater than 40 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 35 to 60 percent, by volume, in the A and E horizons and from 35 to 60 percent throughout the rest of the profile. The soils are very strongly acid or strongly acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The E horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. Texture in the fine-earth fraction is sandy loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR and value and chroma of 4 to 6. Texture in the fine-earth fraction is sandy loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is sandy clay loam, clay loam, or loam.

The Cr horizon is multicolored, soft weathered sillimanite schist, mica gneiss, or mica schist that can be dug with difficulty with hand tools.

Masada Series

The Masada series consists of very deep, well drained, moderately permeable soils on stream terraces on the Piedmont. These soils formed in old alluvium derived from felsic rocks. Slopes range from 2 to 15 percent.

Masada soils are commonly adjacent to Pacolet, Rion, Chewacla, Toccoa, Dogue, and State soils. Pacolet and Rion soils are on ridgetops and side slopes. They formed in residuum. Pacolet soils have a solum that is 20 to 40 inches thick. Rion, Chewacla, Toccoa, and State soils have a subsoil that is coarser than that of the Masada soils. Chewacla soils are on flood plains and are somewhat poorly drained. Toccoa soils are occasionally flooded, are near stream channels, and formed in the more recent alluvium. Dogue soils are moderately well drained. Dogue and State soils are in the lower terrace positions along the flood plains.

Typical pedon of Masada sandy clay loam, 2 to 8 percent slopes, eroded; 12 miles east of North Wilkesboro on N.C. Highway 268 to Ronda, 1.2 miles south of Ronda on Chatham Street onto Roundabout Farm, 50 feet east of the road in a field (1,800 feet north of the Yadkin River, 0.85 mile west and 1,000 feet north of Ronda-Clingman School):

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium granular structure; friable; many fine roots; about 6 percent gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; common fine roots; about 6 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—18 to 42 inches; red (2.5YR 5/8) clay; common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; about 6 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—42 to 58 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) and red (2.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; about 8 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—58 to 60 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/8) and red (2.5YR 5/8) mottles; massive; friable; few fine roots; about 10 percent gravel; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 0 to 35 percent, by volume, throughout the profile. A gravel line may occur in the lower part of the solum and in the C horizon. The soils are very strongly acid or strongly acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 8. Where it has value of 3, the horizon is less than 6 inches thick. Texture is sandy clay loam or gravelly sandy clay loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is clay, sandy clay, or clay loam.

The BC horizon has colors similar to those of the Bt horizon and may be mottled in shades of yellow, brown, or red. Texture in the fine-earth fraction is clay loam, sandy clay loam, or sandy clay.

The C horizon and the 2C horizon, if it occurs, has colors similar to those of the Bt horizon or is mottled or

multicolored in shades of yellow, brown, or red. Texture in the fine-earth fraction is sandy loam, sandy clay loam, or clay loam.

Ostin Series

The Ostin series consists of very deep, well drained, rapidly permeable soils adjacent to streams in the mountains. These soils formed from recent alluvial deposition (fig. 21). Slopes range from 1 to 5 percent.

Ostin soils are adjacent to Reddies, Rosman, Tate, Greenlee, Cullowhee, Chestnut, Edneyville, Ashe, and Cleveland soils. Reddies, Rosman, and Cullowhee soils do not have gravelly or cobbly strata within a depth of 20 inches. Cullowhee soils are in low areas adjacent to stream channels and are somewhat poorly drained. Tate and Greenlee soils have a subsoil that is finer textured than that of the Ostin soils. Tate soils have less than 35 percent rock fragments, by volume, throughout. Greenlee soils have rock fragments throughout that are larger than those of the Ostin soils. Chestnut, Edneyville, Ashe, and Cleveland soils formed in residuum and are on ridgetops and side slopes. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Cleveland soils have hard unweathered bedrock at a depth of 10 to 20 inches.

Typical pedon of Ostin very cobbly loamy sand, 1 to 5 percent slopes, occasionally flooded; 14 miles north of North Wilkesboro near the community of McGrady on N.C. Highway 18, about 4.7 miles east on Secondary Road 1728 to Secondary Road 1730, about 2.1 miles northeast on Secondary Road 1730, about 400 feet southeast of the road, 20 feet north of Basin Creek in a pasture:

A—0 to 4 inches; dark brown (10YR 3/3) very cobbly loamy sand; weak fine granular structure; very friable; common fine roots; about 40 percent cobbles and gravel; few fine flakes of mica; moderately acid; clear smooth boundary.

C—4 to 60 inches; dark yellowish brown (10YR 4/4) very cobbly loamy sand; massive; loose; few fine roots; about 55 percent cobbles and gravel; few fine flakes of mica; moderately acid; clear smooth boundary.

The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 35 to 50 percent, by volume, in the A horizon and from 35 to 70 percent in the C horizon. The soils range from very strongly acid to neutral. The quantity of flakes of mica ranges from few to many throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 6. Where it has value of 3 and chroma of 1 to 3, the horizon is less than 7 inches thick. Some pedons have a nongravelly or a gravelly surface layer.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is loamy sand or sand.

Pacolet Series

The Pacolet Series consists of very deep, well drained, moderately permeable soils on piedmont uplands. These soils formed in material weathered from rocks such as granite, gneiss, and schist. Slopes range from 2 to 25 percent.

Pacolet soils are commonly adjacent to Rion, Wedowee, Masada, Chewacla, and Toccoa soils. Rion, Chewacla, and Toccoa soils have a subsoil that is coarser than that of the Pacolet soils. Wedowee soils do not have red colors in the subsoil. Masada soils are on high stream terraces and have a solum that is 40 to 60 inches thick. Chewacla and Toccoa soils are on flood plains. Chewacla soils are somewhat poorly drained.

Typical pedon of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded; 13 miles east of Wilkesboro on U.S. Highway 421, about 0.4 mile south on Secondary Road 2400, about 250 feet east-southeast of the road, in a field:

Ap—0 to 8 inches; brown (7.5YR 4/4) sandy clay loam; moderate medium granular structure; very friable; many fine and medium roots; about 8 percent gravel; few fine flakes of mica; slightly acid; abrupt smooth boundary.

Bt—8 to 23 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine roots; about 6 percent gravel; few fine flakes of mica; moderately acid; gradual wavy boundary.

BC—23 to 31 inches; red (2.5YR 4/8) clay loam; few fine distinct reddish yellow (5YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine roots; about 8 percent gravel; common fine flakes of mica; moderately acid; gradual wavy boundary.

C1—31 to 40 inches; yellowish red (5YR 5/8) saprolite of sandy loam; massive; very friable; about 8 percent gravel; common fine flakes of mica; strongly acid.

C2—40 to 60 inches; saprolite of sandy loam that is multicolored in shades of brown; massive; very friable; about 10 percent gravel; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 20 to 40 inches (fig. 22). The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 2 to 15 percent, by volume, throughout the profile. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A or Ap horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 8. Texture is commonly sandy loam in slightly eroded areas and sandy clay loam in eroded areas.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Texture is loam, fine sandy loam, or sandy loam.

The BA horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 8. Texture is clay loam, sandy clay loam, or loam.

The Bt horizon has hue of 2.5YR, value of 4 or 5, and chroma of 6 to 8. Mottles in shades of yellow or brown are in the upper part of the horizon in some pedons. Texture is clay, sandy clay, or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It commonly has mottles in shades of brown or yellow. Texture is clay loam, sandy clay loam, loam, or sandy loam.

The C horizon is multicolored saprolite weathered from granite, gneiss, or schist. Texture is loam or sandy loam.

Porters Series

The Porters series consists of deep, well drained, moderately rapidly permeable soils on mountain ridgetops. These soils formed from material weathered from rocks such as gneiss and amphibolite. Slopes range from 15 to 25 percent.

Porters soils are adjacent to Ashe, Chestnut, and Edneyville soils. These adjacent soils do not have a dark surface layer at least 7 inches thick. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches.

Typical pedon of Porters loam, 15 to 25 percent slopes, stony; 22.4 miles west of Wilkesboro on U.S. Highway 421 to the Blue Ridge Parkway, 2.8 miles north on the parkway, in Wilkes County, just across the Ashe-Wilkes County line, 150 feet south of the road in a wooded area:

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; weak medium and coarse granular structure; friable; many fine and medium roots; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

Bw—9 to 39 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; many fine and medium roots; common fine flakes of mica; about 5 percent gravel; very strongly acid; gradual wavy boundary.

C—39 to 57 inches; dark yellowish brown (10YR 4/4) saprolite of loamy sand; massive; very friable; few fine roots; many fine flakes of mica; very strongly acid; clear wavy boundary.

Cr—57 to 60 inches; soft weathered gneiss bedrock that is partly consolidated but can be dug with difficulty with hand tools.

The thickness of the solum ranges from 20 to 50 inches. The depth to soft weathered bedrock ranges from 40 to 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and from 0 to 35 percent throughout the B and C horizons. The soils range from very strongly acid to slightly acid throughout. The quantity of flakes of mica is few or common in the A and B horizons and ranges from few to many in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 4.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is loam, fine sandy loam, or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is commonly multicolored. Texture in the fine-earth fraction is loam, fine sandy loam, sandy loam, or loamy sand.

The Cr horizon is soft weathered bedrock that can be dug with difficulty with hand tools.

Reddies Series

The Reddies series consists of very deep, moderately well drained, moderately rapidly permeable soils in the mountains. These soils dominantly formed from loamy alluvium underlain by contrasting sandy, gravelly, or cobbly strata. Slopes range from 0 to 3 percent.

Reddies soils are adjacent to Ostin, Rosman, Tate, Braddock, Cullowhee, Chestnut, Edneyville, Evard, and Cowee soils. Ostin soils have gravelly or cobbly strata within a depth of 20 inches. Rosman soils do not have contrasting sandy, gravelly, or cobbly strata within a depth of 40 inches. Tate, Braddock, Evard, and Cowee soils have a subsoil that is finer textured than that of the Reddies soils. Tate and Braddock soils have less than 35 percent rock fragments, by volume, throughout. They are mostly on toe slopes in colluvial and alluvial

areas. Cullowhee soils are in low areas adjacent to stream channels and are somewhat poorly drained. Chestnut and Edneyville soils formed in residuum and are on ridgetops and side slopes of the higher mountains. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Evard and Cowee soils formed from residuum on ridgetops and side slopes of the lower mountains.

Typical pedon of Reddies fine sandy loam in an area of Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded; 10.1 miles north of Wilkesboro on N.C. Highway 16 to Secondary Road 1559, about 2.3 miles north to Secondary Road 1570, about 2.0 miles northeast on Secondary Road 1570 to Secondary Road 1567, about 1.4 miles north on Secondary Road 1567, about 350 feet southwest of the road in a field:

Ap—0 to 10 inches; dark brown (10YR 3/3) fine sandy loam; weak very fine granular structure; very friable; many fine roots; about 4 percent gravel; common fine flakes of mica; moderately acid; clear smooth boundary.

Bw—10 to 29 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; about 4 percent gravel; common fine flakes of mica; slightly acid; gradual wavy boundary.

C—29 to 60 inches; dark yellowish brown (10YR 4/4) extremely gravelly sand; pebbles are water rounded; massive; loose; about 70 percent gravel; few fine flakes of mica; slightly acid.

The solum is 20 to 39 inches thick over sand, gravel, or cobbles. The depth to bedrock is greater than 60 inches. Strata containing more than 35 percent, by volume, rock fragments are between depths of 20 and 40 inches. Rock fragments are mainly gravel or cobbles. The content of rock fragments ranges from 2 to 15 percent, by volume, in the A and Bw horizons and is more than 35 percent in the C horizon. The soils are very strongly acid to neutral throughout. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. Some pedons have a recently deposited thin layer of sandy overwash.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Iron depletions with chroma of 2 or less occur below a depth of 20 inches in some pedons. Texture is loam, sandy loam, or fine sandy loam.

The C horizon is multicolored or has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture in the fine-earth fraction is sand.

Rion Series

The Rion series consists of very deep, well drained, moderately permeable soils on uplands and side slopes of the Piedmont. These soils formed in material weathered from rocks such as granite, gneiss, and schist. Slopes range from 5 to 60 percent.

Rion soils are commonly adjacent to Pacolet, Wedowee, Ashlar, Wateree, Chewacla, and Toccoa soils. Pacolet and Wedowee soils have a subsoil that is finer textured than that of the Rion soils. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Wateree soils have a subsoil that is coarser than that of the Rion soils and have soft weathered bedrock at a depth of 20 to 40 inches. They are on very steep side slopes. Chewacla and Toccoa soils formed in alluvium and are on flood plains. Chewacla soils are somewhat poorly drained.

Typical pedon of Rion fine sandy loam, 25 to 60 percent slopes; 9.0 miles east of Wilkesboro on N.C. Highway 268, about 0.55 mile northwest on Secondary Road 1989, about 200 feet west of the road in a wooded area:

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 11 percent gravel; few fine flakes of mica; strongly acid; clear smooth boundary.

BE—4 to 8 inches; reddish yellow (7.5YR 6/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; about 8 percent gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—8 to 21 inches; yellowish red (5YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 6 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—21 to 30 inches; yellowish red (5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; about 8 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C1—30 to 42 inches; strong brown (7.5YR 5/6) saprolite of sandy loam; common fine distinct yellowish red (5YR 5/6) mottles; massive; very friable; about 8 percent gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C2—42 to 60 inches; multicolored saprolite of sandy loam; massive; very friable; about 10 percent gravel; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40

inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 2 to 15 percent, by volume, throughout the profile. The soils range from very strongly acid to slightly acid throughout unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The E, BE, or BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Texture is dominantly sandy loam, fine sandy loam, or loam. Texture may also be sandy clay loam in the BE or BA horizon.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Mottles in shades of red, brown, or yellow may occur. Texture is dominantly sandy clay loam or clay loam but ranges to sandy loam in some pedons. In some pedons the horizon may have thin layers of sandy clay.

The BC horizon is similar in color to the Bt horizon. Texture is loam, sandy loam, sandy clay loam, or clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8 or is multicolored. It is saprolite that has a texture of sandy loam or fine sandy loam.

Rosman Series

The Rosman series consists of very deep, well drained, moderately rapidly permeable soils that formed from recent loamy alluvium on flood plains in the mountains. Slopes range from 0 to 3 percent.

Rosman soils are adjacent to Ostin, Reddies, Tate, Braddock, Cullowhee, Chestnut, Edneyville, Evard, and Cowee soils. Ostin soils have gravelly or cobbly strata within a depth of 20 inches. Reddies soils have contrasting sandy, gravelly, and cobbly strata at a depth of 20 to 40 inches. Tate, Braddock, Evard, and Cowee soils have a subsoil that is finer textured than that of the Rosman soils. Tate and Braddock soils are mostly on toe slopes in colluvial and alluvial areas. Evard and Cowee soils formed from residuum on ridgetops and side slopes of the lower mountains. Cullowhee soils are in low areas adjacent to stream channels and are somewhat poorly drained. Greenlee soils have large rock fragments throughout. Chestnut and Edneyville soils formed in residuum. They are on ridgetops and side slopes of the higher mountains. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches.

Typical pedon of Rosman fine sandy loam in an area of Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded; 14 miles north of North Wilkesboro near the community of McGrady on N.C. Highway 18, about 4.7 miles east on Secondary Road 1728 to Secondary Road 1730, about 2.0 miles northeast on Secondary Road 1730, about 350 feet south of the road in a field:

Ap—0 to 12 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; about 4 percent gravel; common fine flakes of mica; slightly acid; clear smooth boundary.

Bw—12 to 40 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; about 4 percent gravel; common fine flakes of mica; slightly acid; gradual irregular boundary.

C—40 to 60 inches; yellowish brown (10YR 5/6) loam; massive; very friable; about 5 percent gravel; few fine distinct yellow (10YR 7/6) and light gray (10YR 7/2) iron depletions; few fine flakes of mica; slightly acid.

The thickness of the solum ranges from 35 to 60 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel within a depth of 40 inches and gravel or cobbles below that depth. The content of rock fragments ranges from 2 to 15 percent within a depth of 40 inches. Below a depth of 40 inches, it may be as much as 50 percent in some pedons. Reaction is strongly acid to slightly acid unless limed. The quantity of flakes of mica ranges from few to many throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have a thin surface layer of recent sandy overwash.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 8. Iron depletions with chroma of 2 or less are below a depth of 20 inches in some pedons. Texture is loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 8. Iron depletions and accumulations may occur. Texture in the fine-earth fraction varies but typically ranges from coarse sand to loam.

Saluda Series

The Saluda series consists of shallow, well drained, moderately permeable soils on mountain ridgetops and side slopes of the lower mountains. These soils formed in material weathered from rocks such as granite, gneiss, and sillimanite schist. Slopes range from 8 to 60 percent.

Saluda soils are commonly adjacent to Evard, Cowee, Braddock, and Tate soils. Evard, Braddock, and Tate soils do not have bedrock within a depth of 60 inches. Braddock and Tate soils formed in colluvium and old alluvium. Braddock soils are on foot slopes and high stream terraces. Tate soils are on stream terraces. Braddock soils have a subsoil that is finer textured than that of the Saluda soils. Cowee soils have soft weathered bedrock at a depth of 20 to 40 inches.

Typical pedon of Saluda gravelly sandy loam in an area of Cowee-Saluda complex, 8 to 25 percent slopes, stony; 8.8 miles south of Wilkesboro on Secondary Road 1001, about 4.0 miles east-southeast on Secondary Road 2477, about 250 feet east of the road on a ridgetop in a wooded area:

A—0 to 6 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 23 percent gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt—6 to 18 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; weak fine subangular blocky structure; friable; common fine and medium roots; about 20 percent gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cr—18 to 40 inches; soft weathered sillimanite schist that can be dug with difficulty with hand tools.

The thickness of the solum and the depth to soft weathered bedrock range from 10 to 20 inches. Hard unweathered bedrock is at a depth of more than 40 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 20 percent in the Bt horizon. The soils range from very strongly acid to slightly acid throughout. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Texture in the fine-earth fraction is sandy loam, sandy clay loam, or clay loam. Some pedons have a thin BA or BC horizon of sandy loam or fine sandy loam.

The Cr horizon is soft weathered bedrock that can be dug with difficulty with hand tools. The horizon is variable in color. It formed from granite, gneiss, or sillimanite schist.

State Series

The State series consists of very deep, well drained, moderately permeable soils on low stream terraces on the Piedmont. These soils formed in alluvium derived from a mixture of felsic rocks. Slopes range from 1 to 6 percent.

State soils are commonly adjacent to Rion, Chewacla, Toccoa, Dogue, and Masada soils. Rion soils are on ridgetops and side slopes. They formed from residuum. Chewacla soils are on flood plains, are somewhat poorly drained, and are frequently flooded. Toccoa soils have a subsoil that is coarser than that of the State soils. They are occasionally flooded and are near stream channels in the more recent alluvium. Dogue and Masada soils have a subsoil that is finer textured than that of the State soils. Dogue soils are moderately well drained and are in the lower terrace positions on flood plains. Masada soils are in the higher terrace positions.

Typical pedon of State fine sandy loam, 1 to 6 percent slopes, rarely flooded; 2 miles west of Wilkesboro on N.C. Highway 268, about 400 feet north of the highway, in a cultivated field:

Ap—0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; few fine roots; few fine flakes of mica; strongly acid; abrupt smooth boundary.

BA—10 to 20 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt—20 to 38 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

BC—38 to 58 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—58 to 72 inches; brown (10YR 5/3) loamy sand; single grain; loose; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel but include cobbles in the lower part of the profile. The content of rock fragments ranges from 0 to 2 percent, by volume, throughout the solum and from 0 to 25 percent in the C horizon. The soils are very strongly acid or strongly acid in the A horizon and in the upper part of the B horizon, unless limed, and range from very strongly acid to slightly acid in the lower part of the B horizon and in the C horizon. The quantity of flakes of mica is few or common throughout the profile.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is sandy loam, fine sandy loam, loam, or sandy clay loam.

The Bt horizon dominantly has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The lower part of the Bt horizon may be mottled or have hue of 2.5Y. Texture is loam, clay loam, sandy clay loam, or sandy loam.

The BC horizon is similar in color to the lower part of the Bt horizon. Texture is sandy loam, fine sandy loam, loam, or sandy clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8 or is mottled. Texture in the fine-earth fraction is commonly stratified and includes sand, loamy sand, and sandy loam.

Tate Series

The Tate series consists of very deep, well drained, moderately permeable soils on mountain stream terraces, foot slopes, and benches. These soils formed from colluvial and alluvial sediments. Slopes range from 2 to 25 percent.

Tate soils are commonly adjacent to Cowee, Cullowhee, Evard, Reddies, Rosman, Chestnut, Edneyville, and Braddock soils. Cowee and Evard soils are in the higher, residual landscape positions on ridgetops and side slopes. They have a subsoil that is redder than that of the Tate soils. Cowee soils have soft weathered bedrock at a depth of 20 to 40 inches. Cullowhee, Reddies, and Rosman soils are commonly in the lower landscape positions in drainageways and on flood plains. They have a subsoil or underlying material that is coarser than that of the Tate soils. Cullowhee soils are somewhat poorly drained. Cullowhee and Reddies soils have contrasting sandy, gravelly, or cobbly strata at a depth of 20 to 40 inches. Chestnut and Edneyville soils are residual soils on ridgetops and side slopes in the higher mountains. Braddock soils have a subsoil that is finer textured than that of the Tate soils and have a redder subsoil.

Typical pedon of Tate fine sandy loam, 8 to 25 percent slopes; 14 miles north of North Wilkesboro on N.C. Highway 18 to Secondary Road 1728, about 4.7 miles east on Secondary Road 1728, about 3.2 miles northeast on Secondary Road 1730, about 150 feet east of the road in a pasture:

A1—0 to 3 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; about 5 percent gravel; common fine flakes of mica; moderately acid; clear smooth boundary.

A2—3 to 9 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 5 percent gravel; common fine flakes of mica; moderately acid; clear wavy boundary.

BA—9 to 15 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; common fine and medium roots; common fine flakes of mica; slightly acid; clear wavy boundary.

Bt—15 to 31 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; slightly acid; gradual wavy boundary.

BC—31 to 43 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; very friable; few fine roots; few fine flakes of mica; slightly acid; gradual irregular boundary.

C—43 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; very friable; about 6 percent gravel; common fine flakes of mica; slightly acid.

The thickness of the solum ranges from 30 to 60 inches or more (fig. 23). The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel but include cobbles. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A and Bt horizons and from 0 to 35 percent in the BC and C horizons. The soils range from very strongly acid to slightly acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. Where it has value of 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Texture is sandy clay loam, clay loam, loam, sandy loam, or fine sandy loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The BC horizon has colors similar to those of the Bt horizon. Texture in the fine-earth fraction is fine sandy loam or loam.

The C horizon is variable in color. Texture in the fine-earth fraction is sandy or loamy. Sandy textures are restricted to depths below 40 inches.

Toccoa Series

The Toccoa series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvium on flood plains on the Piedmont. Slopes range from 0 to 3 percent.

Toccoa soils are commonly adjacent to Buncombe, Chewacla, Dogue, State, Masada, Pacolet, and Rion soils. Buncombe soils have a sandy substratum and are excessively well drained. Chewacla, Dogue, State,

Masada, and Pacolet soils have a subsoil that is finer textured than that of the Toccoa soils. Chewacla soils are somewhat poorly drained. Dogue soils are moderately well drained and are on low stream terraces. State soils are on stream terraces. Masada soils are on high stream terraces. Pacolet and Rion soils are well drained and are on uplands.

Typical pedon of Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded; in Wilkesboro where U.S. Highway 421 crosses the Yadkin River, 250 feet west of the road and 250 feet north of the Yadkin River, in a field:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; common fine roots; few fine flakes of mica; slightly acid; clear wavy boundary.

C1—8 to 55 inches; dark yellowish brown (10YR 4/6) sandy loam that has common thin layers of loamy sand; massive; very friable; few fine roots; few fine flakes of mica; slightly acid; gradual wavy boundary.

C2—55 to 60 inches; yellowish brown (10YR 5/6) loamy sand; massive; very friable; few fine flakes of mica; slightly acid.

The depth to bedrock is greater than 60 inches. The content of rock fragments ranges from 0 to 10 percent, by volume, within a depth of 40 inches. The soils range from strongly acid to slightly acid unless limed. The quantity of flakes of mica ranges from few to many in all horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have iron depletions with chroma of 2 or less below a depth of 20 inches or have buried horizons with colors similar to those of the A horizon. Texture is dominantly sandy loam but includes loamy sand, loam, fine sandy loam, or sandy clay loam. Some pedons have gravelly strata below a depth of 40 inches.

Udorthents

Udorthents consists of areas where the natural soil has been altered by excavation or covered by earthy fill material. These areas are well drained. The excavated areas are mainly borrow areas from which soil material has been removed and used as foundation material for roads or buildings. In some excavated areas the exposed substratum is sandy loam to clay loam. The fill areas are sites where earthy fill material at least 20 inches thick covers the natural soil or where borrow pits, dumps, natural drainageways, or low areas have been filled. Slopes range from gently sloping to strongly sloping.

Because of the variability of Udorthents, a typical pedon is not described. The fill areas are commonly more than 20 inches deep and can be as much as 20 to 30 feet deep in places. Some fill areas contain nonsoil material, such as concrete, wood, glass, and asphalt. The soil material in fill areas is stratified and variable in color and texture.

Udorthents generally have hue of 2.5YR to 10YR, value of 3 to 7, and chroma of 1 to 8. Texture of individual layers is variable and ranges from sandy loam to clay, but the average texture is loamy. Reaction ranges from extremely acid to slightly acid.

Watauga Series

The Watauga series consists of very deep, well drained, moderately permeable soils on mountain uplands. These soils formed in material weathered from rocks such as mica schist and mica gneiss. Slopes range from 8 to 25 percent.

Watauga soils are commonly adjacent to Ashe, Chestnut, Edneyville, Tate, and Chandler soils. Ashe, Chestnut, Edneyville, and Tate soils do not have micaceous mineralogy. Ashe soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chestnut soils have soft weathered bedrock at a depth of 20 to 40 inches. Edneyville soils do not have bedrock within a depth of 60 inches. Tate soils formed from colluvium. Chandler soils have a subsoil that is coarser than that of the Watauga soils. They are on side slopes.

Typical pedon of Watauga loam, 8 to 15 percent slopes; 20 miles northwest of Wilkesboro on N.C. Highway 16, about 5.5 miles south on the Blue Ridge Parkway, 200 feet southwest of the parkway (at Mount Jefferson Overlook) in a pasture:

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam; weak coarse granular structure; very friable; common fine roots; about 5 percent gravel; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt—5 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; about 4 percent gravel; many fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—26 to 31 inches; yellowish brown (10YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable; few fine roots; about 5 percent gravel; many fine flakes of mica; very strongly acid; gradual diffuse boundary.

C1—31 to 44 inches; light yellowish brown (2.5Y 6/4) saprolite of sandy loam; friable; about 6 percent

gravel; many fine flakes of mica; very strongly acid; clear wavy boundary.

C2—44 to 60 inches; light brownish gray (2.5Y 6/2) saprolite of sandy loam; friable; about 8 percent gravel; many fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 2 to 15 percent, by volume, throughout the profile. The soils range from very strongly acid to moderately acid unless limed. The quantity of flakes of mica is common or many in the A horizon and the upper part of the B horizon and many in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Where it has value of 3, the horizon is less than 6 inches thick.

The BE horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is clay loam, loam, or sandy clay loam.

The BC horizon is similar in color to the Bt horizon. It is loam or fine sandy loam.

The C horizon is saprolite that is similar in color to the Bt horizon or is multicolored. It weathered from rocks such as mica schist and mica gneiss. Texture is loam, fine sandy loam, or sandy loam.

Wateree Series

The Wateree series consists of moderately deep, well drained, moderately rapidly permeable soils that formed from residuum on steep and very steep side slopes and river bluffs on the Piedmont. These soils formed from rocks such as granite, gneiss, and schist. Slopes range from 40 to 95 percent.

Wateree soils are commonly adjacent to Pacolet, Wedowee, Ashlar, Rion, Chewacla, and Toccoa soils. Pacolet, Rion, and Wedowee soils have a subsoil that is finer textured than that of the Wateree soils and do not have bedrock within a depth of 60 inches. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Chewacla and Toccoa soils formed from alluvium and are on flood plains. Chewacla soils are somewhat poorly drained.

Typical pedon of Wateree sandy loam in an area of Wateree-Rion complex, 40 to 95 percent slopes; 7.6 miles east of North Wilkesboro on N.C. Highway 268, about 2.0 miles north on Secondary Road 1957, about 1.7 miles northeast on Secondary Road 1990 to a private road on the west bank of the Roaring River, 800 feet along the private road, 150 feet west on a side slope in a wooded area:

A—0 to 4 inches; dark brown (10YR 3/3) sandy loam; few fine distinct dark brown (7.5YR 3/4) mottles; weak fine granular structure; very friable; common fine and medium roots; about 10 percent gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—4 to 22 inches; strong brown (7.5YR 4/6) sandy loam; weak fine subangular blocky structure; very friable; common medium roots; about 10 percent gravel; few fine flakes of mica; thin discontinuous layers of saprolite; strongly acid; clear wavy boundary.

C—22 to 34 inches; multicolored saprolite of sandy loam; massive; very friable; about 12 percent gravel; few fine flakes of mica; moderately acid; clear smooth boundary.

Cr—34 to 60 inches; soft weathered schist that can be dug with difficulty with hand tools.

The thickness of the solum ranges from 14 to 30 inches. The depth to soft weathered bedrock ranges from 20 to 40 inches, and the depth to hard unweathered bedrock is greater than 40 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 2 to 15 percent, by volume, in the A and Bw horizons and from 2 to 25 percent in the C horizon. In some pedons the Bw horizon contains thin discontinuous layers of saprolite. The soils range from very strongly acid to moderately acid. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. Where it has value of 3, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 10YR, value of 4 to 7, and chroma of 3 or 4. Texture is loamy sand, sandy loam, or fine sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 8. Texture commonly is sandy loam or fine sandy loam. In some pedons the horizon has thin layers of loamy sand or sandy clay loam.

The C horizon is multicolored saprolite. Texture in the fine-earth fraction is sand, loamy sand, sandy loam, fine sandy loam, or loam.

The Cr horizon is multicolored, soft weathered bedrock that can be dug with difficulty with hand tools.

Wedowee Series

The Wedowee series consists of very deep, well drained, moderately permeable soils on broad upland ridges on the Piedmont. These soils formed in material

weathered from granodiorite rock. Slopes range from 5 to 15 percent.

Wedowee soils are adjacent to Rion, Ashlar, Pacolet, Masada, and Chewacla soils. Rion soils have a subsoil that is coarser than that of the Wedowee soils. Ashlar soils have hard unweathered bedrock at a depth of 20 to 40 inches. Pacolet soils have a subsoil that is redder than that of the Wedowee soils. Masada soils formed from old alluvium on high stream terraces. Chewacla soils are somewhat poorly drained and formed from more recent alluvium in drainageways and on flood plains.

Typical pedon of Wedowee sandy loam in an area of Rion-Wedowee complex, 5 to 15 percent slopes; 3.5 miles north of North Wilkesboro on N.C. Highway 18 to Secondary Road 1002, about 9.5 miles north on Secondary Road 1002 to Secondary Road 1736, about 3.2 miles north on Secondary Road 1736 to Secondary Road 1737, about 1.5 miles north on Secondary Road 1737, about 200 feet north-northeast in an old abandoned field that supports pines:

Ap—0 to 5 inches; dark yellowish brown (10YR 3/4) sandy loam; weak coarse granular structure; very friable; common fine roots; about 7 percent gravel; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

Bt—5 to 23 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; firm; few fine roots; about 4 percent gravel; common fine flakes of mica; very strongly acid; clear smooth boundary.

BC—23 to 36 inches; yellowish red (5YR 5/8) sandy clay loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; about 6 percent gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—36 to 60 inches; multicolored granodiorite saprolite of sandy loam; massive; friable; about 10 percent gravel; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 2 to 15 percent, by volume, throughout the profile. The soils are very strongly acid or strongly acid unless limed. The quantity of flakes of mica is few in the A horizon and common throughout the Bt and C horizons.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 8. Where it has value of 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 6. Texture is loamy sand, sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 to 8. In some pedons it has mottles in shades of red or brown. Texture is sandy clay loam, clay loam, or clay.

The BC horizon has hue of 2.5YR to 10YR, value of 5 to 7, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The C horizon is multicolored granodiorite saprolite that has a texture of sandy loam, sandy clay, clay loam, or sandy clay loam.

Wehadkee Series

The Wehadkee series consists of very deep, poorly drained, moderately permeable soils that formed from alluvium in small drainageways and on flood plains of the Piedmont. Slopes range from 0 to 2 percent.

Wehadkee soils are commonly adjacent to Toccoa, Chewacla, Dogue, State, Masada, Pacolet, and Rion soils. Toccoa soils are well drained and have a subsoil that is coarser than that of the Wehadkee soils. Chewacla soils are somewhat poorly drained and are in the slightly higher areas. Dogue, Masada, and Pacolet soils have a subsoil that is finer textured than that of the Wehadkee soils. Dogue soils are moderately well drained and are on low stream terraces. Masada, Pacolet, Rion, and State soils are well drained. Masada soils are on high stream terraces. Pacolet and Rion soils formed from residuum on uplands. State soils are on stream terraces.

Typical pedon of Wehadkee loam, 0 to 2 percent slopes, frequently flooded; 11 miles east of Wilkesboro on U.S. Highway 421, about 3.7 miles south on Secondary Road 2400, about 0.8 mile east on Secondary Road 2408, about 1.2 miles south on Secondary Road 2410, about 900 feet northwest of the road in a drainageway:

A—0 to 6 inches; dark gray (10YR 4/1) loam; few fine distinct gray (N 5/0) iron depletions; weak medium granular structure; very friable; many fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bg1—6 to 20 inches; dark gray (N 4/0) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; common medium distinct dark grayish brown (10YR 4/2) iron depletions; few fine distinct dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 4/6) masses of iron accumulation; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bg2—20 to 32 inches; dark gray (N 4/0) clay loam; weak medium subangular blocky structure; friable;

common fine roots; few fine distinct dark grayish brown (10YR 4/2) iron depletions; few fine flakes of mica; small pockets of clay; moderately acid; gradual wavy boundary.

Cg—32 to 60 inches; dark gray (N 4/0) stratified layers of sandy loam; massive; friable; few fine distinct dark grayish brown (10YR 4/2) iron depletions; few fine flakes of mica; strongly acid.

The solum is 20 to more than 60 inches thick over a stratified sandy, loamy, or gravelly substratum. The depth to bedrock is greater than 60 inches. Rock fragments are mainly gravel. The content of rock fragments ranges from 0 to 10 percent, by volume, in the A and Bg horizons and from 0 to 35 percent in the Cg horizon. The soils range from very strongly acid to slightly acid unless limed. The quantity of flakes of mica is few or common throughout the profile.

The A horizon has hue of 10YR or 2.5Y or is neutral in hue and has value of 4 to 6 and chroma of 0 to 4.

The Bg horizon has hue of 10YR to 5Y or is neutral in hue and has value of 4 to 6 and chroma of 0 to 2. Masses of iron accumulation in shades of red, yellow, or brown are common. Texture is sandy clay loam, clay loam, loam, or silt loam.

The Cg horizon has hue of 10YR to 5Y or is neutral in hue and has value of 4 to 7 and chroma of 0 to 2. Masses of iron accumulation in shades of red, yellow, or brown are common. In the fine-earth fraction, the horizon is sandy loam or loam and has stratified layers of clay loam, sandy clay loam, silty clay loam, or sand.

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area. It also discusses the morphology of the soils and the processes of horizon differentiation.

Factors of Soil Formation

Soils formed by processes of the environment acting upon geologic materials, such as metamorphic, igneous, and sedimentary rocks, and fluvial stream sediments. The characteristics of a soil are determined by the combined influence of parent material, climate, organisms, relief, and time. These five factors of soil formation are responsible for the profile development and chemical properties that make soils different *(6)*.

Parent Material

Parent material is the material from which soils form. It influences the mineral and chemical composition of the soils and to a large extent the rate at which soil formation takes place. Residual material, colluvial material, and alluvial sediments are the three major types of parent material in Wilkes County.

Residual material is earthy material derived from the weathering of rocks. It is often referred to as saprolite or residuum. Saprolite underlies the soils in the uplands, which make up most of the land area in the county. Soils that formed in residuum also are influenced by soil creep, or the movement of soil downslope by gravity. Soil creep is more pronounced on the steeper slopes. The saprolite may be several feet thick in some places and only a few inches thick in other places. Gneiss and schist are the two major rock types in the county.

Colluvial material is soil material or rock fragments, or commonly both, that have been moved by the forces of gravity, such as by creep, slide, or local wash, and deposited at the base of steep slopes. Colluvial deposits are very thick in many places in the county.

Alluvial sediments consists of material that has been eroded from upland soils and deposited on flood plains along streams. Recent deposits are composed of sand, silt, clay, and, in some places, gravel and cobbles. The deposits are generally more than 5 feet thick. In some places the alluvial sediments are much older and occur on high stream terraces that formerly were flood plains.

Climate

Because the climate of Wilkes County is generally warm and humid, the soils have been subject to strong weathering and leaching. In most places the soil materials are weathered to a considerable depth because they have been exposed to climatic forces for a long period of time. The materials that are not deeply or strongly weathered are either highly resistant to weathering or have been exposed to weathering for only a short time, such as the material on some steep slopes.

Most of the bases have been leached from the soils, and the soils are naturally acid. Because of weathering and leaching, the natural supply of plant nutrients is low in most of the soils. Because of the downward movement of clay from surface horizons, the subsoil of most of the soils in the uplands is enriched with clay. Alternating periods of wetting and drying and freezing and thawing have resulted in the blocky structure of clay-enriched subsoils.

For more detailed information on the climate in the survey area, see the section "General Nature of the County."

Plant and Animal Life

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in and on the soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Vegetation supplies most of the decomposed organic material that gives a dark color to soil surface horizons and supplies nutrients to these horizons. Plants are important in the change of base status and in the leaching process of a soil through the nutrient cycle.

Under the native forest of the survey area, plants do not bring enough bases to the surface to counteract the effects of leaching.

Generally, the soils of Wilkes County developed under hardwood forest. The trees took up elements from the subsoil and provided organic matter by the deposit of leaves, roots, twigs, and eventually whole plants on the surface. The deposited material was acted upon by organisms and underwent chemical reaction.

In Wilkes County, organic material decomposes rapidly because of the moderate temperatures, the abundant moisture supply, and the character of the organic material. The material decays so rapidly that little accumulates in the soil.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties of the soil. In Wilkes County, most of the organic material accumulates on the surface. It is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates. This mixing generally affects soil structure, helping to make the soil open and porous.

Humans also affect soil structure. In some places tillage and management practices have made soils more porous. In other places foot and vehicle traffic and tillage equipment have compacted soils and made them more dense. In some areas intensive use and disturbance of soils by human activities have caused an increase in soil erosion, which is commonly accompanied by an increase in deposition on flood plains and in depressions. In other areas humans have used practices that have slowed the rate of erosion. Many soils have been chemically altered through the use of limes and fertilizers, which make the soils more favorable for the desired plants.

Relief

Relief influences soil formation by its effect on surface runoff and the percolation of water through the soil. Higher rates of surface runoff reduce the amount of water in the soil available for plant growth. Water movement through the soil profile is important in soil development because it aids chemical reactions and is necessary for leaching. In Wilkes County, relief is largely determined by the kind of underlying bedrock, the geology of the area, lifting and folding of the landscape, and the extent that the landscape is dissected by streams.

Slopes in the county range form 0 to 95 percent. In upland areas where slopes are less than 15 percent, the soils generally have deeper, better defined profiles than the steeper soils. Examples are the well developed Pacolet and Hayesville soils. Relief also is important in soil formation because it affects the depth of soils. On slopes greater than 25 percent, geologic erosion removes soil material almost as fast as soil forms. As a result, most of the steep or very steep soils have a thin solum. Examples are Ashe, Cleveland, Saluda, Ashlar, and Wateree soils. These soils are not so deep or so well developed as the less sloping soils.

Relief can also affect drainage. Runoff from the uplands tends to accumulate on nearly level flood plains, and a high water table results. Examples of soils in these areas are the poorly drained Wehadkee soils and the somewhat poorly drained Chewacla and Cullowhee soils.

Time

The length of time that soil material has been in place and exposed to the active forces of climate and plant and animal life strongly influences the nature of the soil. The length of time that a soil has been forming is reflected in the degree of profile development.

Soils in the more level upland areas are old. They have B horizons enriched with clay that has moved down from the surface layers. Examples are Pacolet and Hayesville soils, which are classified as Ultisols (meaning ultimate).

Young soils, such as those formed in recent stream sediments, have not been in place long enough to develop distinct horizons. The C horizon in these soils essentially extends to the surface and is subdivided only on the basis of depositional stratification in the soil material. An example is Buncombe soils, which are classified as Entisols (meaning recent).

The steeper soils on uplands, such as Ashe, Cleveland, and Wateree soils, are less developed. They have the structure and color of a B horizon but little clay enrichment. These soils are classified as Inceptisols (meaning inception).

Morphology of the Soils

The results of the soil-forming processes are evidenced by the different layers, or soil horizons, in a profile. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils contain three major horizons—the A, B, and C horizons. Some soils, particularly those in forests, also have an O (organic) horizon at the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of humified organic

material that has little admixture of mineral material. The major horizons can be subdivided to indicate differences within the horizon. For example, the Bt horizon has an accumulation of clay from overlying horizons and represents the best developed part of a B horizon. Pacolet soils have a Bt horizon.

The A horizon is a mineral surface layer. It commonly is darkened by humified organic matter. An Ap horizon is a plow layer commonly darkened by organic matter. The maximum extent of leaching or eluviation of clay and iron occurs in the A horizon. In an E horizon, considerable leaching has occurred and organic matter has not darkened the soil material. The E horizon, if it occurs, commonly is the lightest-colored horizon in the profile.

The B horizon commonly underlies the A horizon and is called the subsoil. The maximum extent of accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer occurs in this horizon. The B horizon commonly has blocky structure. It generally is firmer and lighter colored than the A horizon, but it is darker than the C or E horizon.

The C horizon underlies the A or B horizon. It consists of materials that are little altered by the soil-forming processes, but it may be modified by weathering. Young soils, such as those that formed in recent alluvium or in manmade deposits of fill materials, may have a C horizon that extends nearly to the surface and may not have a B horizon.

Processes of Horizon Differentiation

One or more soil-forming processes are involved in the formation of soil horizons. These processes are the accumulation of organic matter; the leaching of carbonates and other soluble material; the chemical weathering, mainly by hydrolysis, of primary minerals into silicate clay minerals; the translocation of silicate clay and some silt-sized particles from one horizon to another; and the reduction and transfer of iron.

These processes have been active in the formation of most of the soils in Wilkes County. The interaction of the first four processes is indicated by the strongly expressed horizons in Evard and Pacolet soils. All five processes have probably been active in the formation of the moderately well drained Dogue soils.

Some organic matter has accumulated in all of the soils in the survey area. Most of the soils contain moderate amounts of organic matter in the surface layer. The content of organic matter ranges from low, as in Pacolet soils, to high, as in Cullasaja soils.

Most of the soils in the survey area are acid, unless the surface layer has been limed, because the bases released during the weathering of soil and saprolite have been leached.

The translocation of clay minerals is an important process in the development of many soils in the survey area. As clay minerals are removed from the A horizon, they accumulate as clay films on the faces of peds, in pores, and in root channels in the B horizon.

As silicate clay forms from primary minerals, some iron is commonly released as hydrated oxides. These oxides are generally red. Even if they occur in small amounts, they give the soil material a reddish or brownish color. These colors are best expressed in the subsoil.

The reduction and transfer of iron have occurred in all of the soils that are not characterized by good natural drainage. This process, known as gleying, is evidenced by a gray matrix color and by iron or clay depletions. Some of the iron may be reoxidized and segregated, and thus yellow, brown, red, or other brightly colored masses of iron accumulations form in an essentially gray matrix in the subsoil. Nodules or concretions of iron or manganese also commonly form as a result of this process. Soil features associated with chemically reduced iron are referred to as redoximorphic features *(20)*.

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Glossary

Access road. A road constructed to facilitate the use and management of the land. Access roads are designed for limited traffic and typically consist of a cut slope, a roadbed, and a fill outslope.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Aquifer. A water-bearing bed or stratum of permeable rock, sand, or gravel capable of fielding considerable quantities of water to wells or springs.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Generally, cool aspects are north- to east-facing and warm aspects are south- to west-facing.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Biotite. A common rock-forming mineral consisting primarily of ferromagnesian silicate minerals. Color ranges from dark brown to green in thin section. Biotite is commonly referred to as "black mica" because of the natural black color.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of

exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channel flow. Storm waters flowing from roads, roofs, parking lots, and other impervious surfaces into intermittent drainageways during and after heavy rainfall.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clod. See Aggregate, soil.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse-loamy. According to family level criteria in the soil taxonomic system, soil containing less than 18 percent clay, by weight, and 15 percent or more fine sand or coarser textured material.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvial fan. A fan-shaped area of soils deposited by mass-wasting (direct gravitational action) and local unconcentrated runoff on and at the base of steeper side slopes.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane that typically takes the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cove. The steep or very steep, concave colluvial area at the head of drainageways on the Piedmont and in mountainous areas. Coves commonly have higher tree site indexes than surrounding slopes.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Crust. A thin, hard layer of soil material that forms on the surface in cultivated areas as the result of fine soil material settling during ponding.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Denitrification. The biochemical reduction of nitrate or nitrite to gaseous nitrogen either as molecular nitrogen or as an oxide of nitrogen.

Depression (depressional area). A portion of land surrounded on all sides by higher land. These areas generally do not have outlets for drainage.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diorite. A coarse grained igneous rock with the composition of andesite (no quartz or orthoclase). It is composed of about 75 percent plagioclase feldspars with the balance being ferromagnesian silicates.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A narrow, gently sloping to very steep, concave colluvial area along an intermittent or perennial stream.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Eroded (soil phase). Because of erosion, these soils have lost an average of 25 to 75 percent of the original A horizon or the uppermost 2 to 6 inches if the original A horizon was less than 8 inches thick.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most areas, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. A term describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in metric tons per hectare (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per hectare	none
Less than 2.5 tons per hectare	slight
2.5 to 10 tons per hectare	moderate
10 to 25 tons per hectare	severe
More than 25 tons per hectare	very severe

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Felsic rock. A general term for light-colored igneous rock and some metamorphic crystalline rock that have an abundance of quartz, feldspars, feldspathoids, and muscovite mica.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field border. A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, control competition from adjacent woodland, or provide food and cover for wildlife.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine-loamy. According to family level criteria in the soil taxonomic system, soil containing 18 to 35 percent clay, by weight, and 15 percent or more fine sand or coarser material.

Flooding. The temporary covering of the surface by flowing water from any source, such as

overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Gap. A concave, lower area between ridge crests that generally has lesser slope.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gneiss. A coarse grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate. It is commonly formed by the metamorphism of granite.

Granite. A coarse grained igneous rock dominated by light-colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

Granodiorite. A plutonic rock roughly intermediate in composition between granite and diorite.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope. A concave, horseshoe-shaped slope on a mountain landscape at the beginning of an intermittent drainageway.

High-grade metamorphic rocks. Highly metamorphosed rocks, such as gneiss and schist.

High stream terrace. A terrace, commonly 20 feet or higher in elevation than the adjacent flood plain, that is no longer subject to flooding.

High-value crop. Crops, such as tobacco, cabbage, and tomatoes, that require a high level of management, are labor intensive, and have a high profit potential per acre.

High water table (seasonal). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified

organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Hydroseeding. Applying seed, fertilizer, and mulch to steep areas by spraying a mixture of those ingredients and water under pressure from a truck.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermediate mountains. The part of the landscape that ranges from about 3,000 to 4,800 feet in elevation. It is dominated by mesic soil temperatures.

Intermediate rock. Igneous or metamorphic crystalline rock that is intermediate in composition between mafic and felsic rock.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Intermountain hills. Low hills that are in valleys between mountain ranges. The soils in these areas predominantly have mesic soil temperatures.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a content of clay similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Landform. The description of a given terrain based on position and configuration. Examples are flood plain, stream terrace, fan, mountain slope, and ridge.

Landform position. A particular place within a landform. Examples are summit of a ridge, shoulder of a ridge, nose slope, side slope, back slope, and foot slope.

Landscape. A collection of related, natural landforms; generally, the land surface that can be seen in a single view.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low mountains. The part of the landscape that ranges from about 1,250 to 3,000 feet in elevation. It is dominated by mesic soil temperatures.

Low stream terrace. A terrace in an area that floods, commonly 3 to 10 feet higher in elevation than the adjacent flood plain.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

Microrelief. The concave to convex changes in the land surface occurring over a relatively short distance or within a small area, such as 1 acre.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Muscovite. A nonferromagnesian rock-forming silicate

mineral that has tetrahedra arranged in sheets. Commonly called "white mica" and sometimes called potassic mica.

Native pasture. Pasture that has seeded naturally in native grasses. It is on slopes too steep to manage with modern machinery.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. The downward-sloping convex end of a main ridge or spur ridge.

No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Pegmatite. A small pluton of exceptionally coarse texture, commonly formed at the margin of a batholith characterized by graphic structure. Nearly 90 percent of all pegmatites are simple pegmatites of quartz, orthoclase, and unimportant percentages of micas.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piedmont. The physiographic region of central North Carolina characterized by rolling landscapes formed from the weathering of residual rock material.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size

of the particles, density can be increased only slightly by compaction.

Potential, soil. Relative terms are assigned to classes to indicate the potential of a soil for a particular use as compared with that of other soils in the area. The rating classes do not identify the most profitable soil use or imply a recommendation for a particular use. The following class terms and definitions are used nationwide:

Very high.—Production or performance is at or above local standards because soil conditions are exceptionally favorable, installation or management costs are low, and soil limitations are insufficient.

High.—Production or performance is at or above the level of locally established standards, the costs of measures for overcoming soil limitations are judged locally to be favorable in relation to the expected performance or yields, and soil limitations that continue after corrective measures are installed do not detract appreciably from environmental quality or economic returns.

Medium.—Production or performance is somewhat below locally established standards, the costs of measures for overcoming soil limitations are high, or soil limitations that continue after corrective measures are installed detract from environmental quality or economic returns.

Low.—Production or performance is significantly below local standards, measures that are required to overcome soil limitations are very costly, or soil limitations that continue after corrective measures are installed detract appreciably from environmental quality or economic returns.

Very low.—Production or performance is much below locally established standards, severe soil limitations exist for which economically feasible measures are unavailable, or soil limitations that continue after corrective measures are installed seriously detract from environmental quality or economic returns.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reforestation. The process in which tree seedlings are planted or become naturally established in an area that was once forested.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface, usually having a sharp crest and steep sides.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment

mounted on a tractor with a 200-300 drawbar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils generally are moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Saddle. A localized concave dip in a main ridge where intermittent drainage starts to form on the adjacent side slope.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below. Highly micaceous saprolite is unstable and very susceptible to piping, erosion, slumping, and the failure to support loads.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Seep. A small area where water oozing through the soil causes the surface to remain wet, but water does not flow on the surface.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of

soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The landscape position, parallel to the summit, that is directly below the ridgetop and directly above the side slope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. The landscape position that is directly below the shoulder and directly above the toe slope. It makes up most of the mountainside or hillside.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Skid trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

Slippage. Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Gently sloping	2 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 60 percent
Very steep	40 to 95 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil creep. The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating periods of freezing and thawing.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. Soil map units are generally designed to reflect significant differences in use and management among the soils of a survey area.

Soil puddling. This condition occurs in certain soils if they are driven on while they are wet. Exertion of mechanical force destroys the soil structure by compressing and shearing and results in the rearrangement of the soil particles to a massive or nonstructural state.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. The load-supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Specialty crop. Crops, such as Fraser fir grown for Christmas trees, that require intensive management and a specific combination of soils and climate.

Spring. A small area on the landscape where water flows naturally through the soil and onto the surface.

Spur ridge. A sharply convex portion of a mountain side slope extending from the main ridge to some point at a lower elevation.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal areas per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediments of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.

Moderately suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.

Poorly suited.—The intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a severe hazard of erosion, a high water table, low fertility, and a hazard of flooding. Major soil reclamation, special design, or intensive management practices are needed.

Unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it generally should not be undertaken.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand

is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15 and, at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 percent or more silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 percent or more silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 percent or more clay and 45 percent or more sand.

Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.

Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yield (forest land). The volume of wood fiber from trees harvested in a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at North Wilkesboro, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	46.9	21.9	34.4	71	-1	5	3.69	2.24	5.00	7	3.8
February----	50.7	24.3	37.5	76	4	11	4.00	1.85	5.85	7	3.1
March-------	60.3	32.6	46.5	84	14	65	4.63	2.82	6.25	7	2.0
April-------	69.9	41.1	55.5	91	23	206	3.87	2.04	5.49	6	.0
May---------	77.2	50.1	63.6	91	31	425	4.52	3.21	5.73	8	.0
June--------	83.8	58.8	71.3	95	43	639	4.83	2.34	6.99	7	.0
July--------	86.9	62.8	74.8	97	49	769	4.30	2.46	5.93	8	.0
August------	85.8	61.8	73.8	96	48	733	4.69	2.11	6.90	7	.0
September---	79.6	54.6	67.1	92	36	514	4.27	2.09	6.16	5	.0
October-----	70.3	41.3	55.8	86	23	216	4.15	1.64	6.26	5	.0
November----	60.9	33.0	46.9	80	14	64	3.54	2.06	4.85	6	.1
December----	50.5	25.4	37.9	73	5	14	3.66	1.72	5.33	6	1.3
Yearly:											
Average---	68.6	42.3	55.4	---	---	---	---	---	---	---	---
Extreme---	102	-9	---	98	-1	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,660	50.15	43.79	56.31	79	10.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at North Wilkesboro, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 5	Apr. 22	May 10
2 years in 10 later than--	Mar. 31	Apr. 18	May 6
5 years in 10 later than--	Mar. 22	Apr. 11	Apr. 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 21	Oct. 11	Sept. 30
2 years in 10 earlier than--	Oct. 28	Oct. 16	Oct. 5
5 years in 10 earlier than--	Nov. 10	Oct. 26	Oct. 16

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at North Wilkesboro, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	194	175	149
8 years in 10	202	181	157
5 years in 10	216	193	171
2 years in 10	230	205	184
1 year in 10	238	211	192

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BhC	Bethlehem-Hibriten complex, 6 to 15 percent slopes	262	*
BrB2	Braddock clay loam, 2 to 8 percent slopes, eroded	498	0.1
BrD2	Braddock clay loam, 8 to 25 percent slopes, eroded	2,705	0.6
BuB	Buncombe loamy sand, 0 to 6 percent slopes, occasionally flooded	1,255	0.3
CdF	Chandler gravelly fine sandy loam, 25 to 80 percent slopes	993	0.2
CeD	Chestnut-Ashe complex, 8 to 25 percent slopes, very stony	906	0.2
CeF	Chestnut-Ashe complex, 25 to 90 percent slopes, very stony	32,304	6.7
ChD	Chestnut-Edneyville complex, 8 to 25 percent slopes, stony	4,964	1.0
ChE	Chestnut-Edneyville complex, 25 to 60 percent slopes, stony	33,356	6.9
CkA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	9,832	2.0
CrF	Cleveland-Rock outcrop complex, 8 to 90 percent slopes	3,220	0.7
CsD	Cowee-Saluda complex, 8 to 25 percent slopes, stony	8,693	1.8
CsE	Cowee-Saluda complex, 25 to 60 percent slopes, stony	21,711	4.5
CuE	Cullasaja very cobbly sandy loam, 15 to 60 percent slopes, extremely bouldery	484	0.1
CwA	Cullowhee fine sandy loam, 0 to 3 percent slopes, frequently flooded	1,040	0.2
DoB	Dogue fine sandy loam, 1 to 6 percent slopes, rarely flooded	825	0.2
EdD	Edneytown gravelly sandy loam, 8 to 25 percent slopes	387	0.1
ErC	Evard gravelly sandy loam, 6 to 15 percent slopes	1,576	0.3
ErD	Evard gravelly sandy loam, 15 to 25 percent slopes	6,460	1.3
EsD	Evard-Cowee complex, 8 to 25 percent slopes, stony	25,598	5.3
EsE	Evard-Cowee complex, 25 to 60 percent slopes, stony	73,677	15.2
GrD	Greenlee-Ostin complex, 3 to 40 percent slopes, very stony	2,818	0.6
HaC2	Hayesville sandy clay loam, 6 to 15 percent slopes, eroded	1,993	0.4
HbE	Hibriten very cobbly sandy loam, 15 to 45 percent slopes	322	0.1
MaB2	Masada sandy clay loam, 2 to 8 percent slopes, eroded	2,733	0.6
MaC2	Masada sandy clay loam, 8 to 15 percent slopes, eroded	4,475	0.9
MsB2	Masada gravelly sandy clay loam, 2 to 8 percent slopes, eroded	1,375	0.3
MsC2	Masada gravelly sandy clay loam, 8 to 15 percent slopes, eroded	649	0.1
MuC	Masada-Urban land complex, 2 to 15 percent slopes	157	*
OsB	Ostin very cobbly loamy sand, 1 to 5 percent slopes, occasionally flooded	739	0.2
PaD	Pacolet sandy loam, 15 to 25 percent slopes	49,179	10.1
PcB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded	28,867	5.9
PcC2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded	73,179	15.1
PrC	Pacolet-Urban land complex, 2 to 15 percent slopes	4,128	0.9
PrD	Pacolet-Urban land complex, 15 to 25 percent slopes	128	*
Pt	Pits, quarries	119	*
PwD	Porters loam, 15 to 25 percent slopes, stony	100	*
RnD	Rion fine sandy loam, 15 to 25 percent slopes	5,026	1.0
RnE	Rion fine sandy loam, 25 to 60 percent slopes	41,833	8.6
RsD	Rion-Ashlar complex, 15 to 35 percent slopes, stony	2,519	0.5
RwC	Rion-Wedowee complex, 5 to 15 percent slopes	2,028	0.4
Rx	Rock outcrop	186	*
RzA	Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded	3,128	0.6
StB	State fine sandy loam, 1 to 6 percent slopes, rarely flooded	1,902	0.4
TaD	Tate fine sandy loam, 8 to 25 percent slopes	3,417	0.7
TcC	Tate-Cullowhee complex, 0 to 25 percent slopes	6,672	1.4
ToA	Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded	6,506	1.3
UdC	Udorthents-Urban land complex, 1 to 15 percent slopes	2,201	0.5
UfB	Udorthents-Urban land complex, 1 to 6 percent slopes, rarely flooded	845	0.2
WaC	Watauga loam, 8 to 15 percent slopes	157	*
WaD	Watauga loam, 15 to 25 percent slopes	819	0.2
WeF	Wateree-Rion complex, 40 to 95 percent slopes	1,952	0.4
WhA	Wehadkee loam, 0 to 2 percent slopes, frequently flooded	516	0.1
	Water	3,968	0.8
	Total	485,382	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Grass hay	Grass-legume hay	Pasture	Soybeans	Tobacco	Corn silage
		Bu	Tons	Tons	AUM*	Bu	Lbs	Tons
BhC:								
Bethlehem	IVe	70	3.0	3.0	7.8	20	1,800	11
Hibriten	VIs	---	2.7	---	7.0	---	---	---
BrB2 Braddock	IIIe	115	4.0	4.0	10.6	---	---	18
BrD2 Braddock	VIe	---	---	---	---	---	---	---
BuB Buncombe	IVw	60	---	---	5.0	---	---	9
CdF Chandler	VIIe	---	---	---	---	---	---	---
CeD:								
Chestnut	VIe	---	2.5	---	6.5	---	---	---
Ashe	VIe	---	2.0	---	---	---	---	---
CeF Chestnut-Ashe	VIIe	---	---	---	---	---	---	---
ChD:								
Chestnut	VIe	---	2.5	---	6.5	---	---	---
Edneyville	VIe	---	3.0	---	7.8	---	---	---
ChE:								
Chestnut	VIIe	---	---	---	---	---	---	---
Edneyville	VIIe	---	---	---	---	---	---	---
CkA Chewacla	IVw	130	4.0	4.0	11.0	40	---	20
CrF**:								
Cleveland	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
CsD:								
Cowee	VIe	---	2.5	---	6.5	---	---	---
Saluda	VIe	---	2.0	---	5.0	---	---	---
CsE Cowee-Saluda	VIIe	---	---	---	---	---	---	---
CuE Cullasaja	VIIs	---	---	---	---	---	---	---
CwA Cullowhee	IIIw	100	3.5	3.5	9.0	---	---	15

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Grass hay	Grass-legume hay	Pasture	Soybeans	Tobacco	Corn silage
		Bu	Tons	Tons	AUM*	Bu	Lbs	Tons
DoB------------- Dogue	IIe	115	4.0	4.0	10.6	---	---	18
EdD------------- Edneytown	VIe	---	3.0	---	7.8	---	---	---
ErC------------- Evard	IVe	---	3.5	3.5	9.0	---	---	---
ErD------------- Evard	VIe	---	3.0	---	7.8	---	---	---
EsD:								
Evard-----------	VIe	---	3.0	---	7.8	---	---	---
Cowee-----------	VIe	---	2.5	---	6.5	---	---	---
EsE------------- Evard-Cowee	VIIe	---	---	---	---	---	---	---
GrD:								
Greenlee--------	VIIs	---	---	---	---	---	---	---
Ostin-----------	VIs	---	---	---	---	---	---	---
HaC2------------ Hayesville	IVe	---	3.5	3.5	9.0	---	---	---
HbE------------- Hibriten	VIIs	---	---	---	5.0	---	---	---
MaB2------------ Masada	IIIe	110	4.0	4.0	10.6	---	---	17
MaC2------------ Masada	IVe	100	3.5	3.5	9.0	---	---	15
MsB2------------ Masada	IIIe	90	3.5	3.5	9.0	---	---	14
MsC2------------ Masada	IVe	75	3.0	3.0	7.8	---	---	12
MuC**:								
Masada----------	IVe	---	---	---	---	---	---	---
Urban land------	VIIIs	---	---	---	---	---	---	---
OsB------------- Ostin	VIs	---	2.5	---	6.5	---	---	---
PaD------------- Pacolet	VIe	---	3.0	3.0	7.8	---	---	---
PcB2------------ Pacolet	IIIe	90	3.5	3.5	9.0	30	2,600	14
PcC2------------ Pacolet	IVe	85	3.5	3.5	9.0	25	2,300	13

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Grass hay	Grass-legume hay	Pasture	Soybeans	Tobacco	Corn silage
		Bu	Tons	Tons	AUM*	Bu	Lbs	Tons
PrC**:								
Pacolet	IVe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
PrD**:								
Pacolet	VIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
Pt**. Pits	VIIIs	---	---	---	---	---	---	---
PwD. Porters	VIe	---	---	---	---	---	---	---
RnD. Rion	VIe	---	3.0	3.0	7.8	---	---	---
RnE. Rion	VIIe	---	---	---	---	---	---	---
RsD:								
Rion	VIIe	---	2.5	---	6.5	---	---	---
Ashlar	VIIe	---	2.0	---	5.0	---	---	---
RwC:								
Rion	IVe	80	3.0	3.0	7.8	25	2,000	12
Wedowee	IVe	80	3.0	3.0	7.8	25	2,200	12
Rx**. Rock outcrop	VIIIs	---	---	---	---	---	---	---
RzA:								
Rosman	IIw	135	4.5	4.5	11.7	---	---	21
Reddies	IIw	125	4.5	4.5	11.7	---	---	20
StB. State	IIe	135	4.5	4.5	11.7	40	2,800	21
TaD. Tate	VIe	---	3.5	3.5	9.0	---	---	---
TcC:								
Tate	VIe	---	3.5	3.5	9.0	---	---	---
Cullowhee	IIIw	100	3.5	3.5	9.0	---	---	---
ToA. Toccoa	IIw	115	4.0	4.0	10.6	---	---	18
UdC**, UfB**:								
Udorthents	VIIs	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Grass hay	Grass-legume hay	Pasture	Soybeans	Tobacco	Corn silage
		Bu	Tons	Tons	AUM*	Bu	Lbs	Tons
WaC------------- Watauga	IVe	---	3.0	3.0	7.8	---	---	---
WaD------------- Watauga	VIe	---	2.5	2.5	6.5	---	---	---
WeF------------- Wateree-Rion	VIIe	---	---	---	---	---	---	---
WhA------------- Wehadkee	VIw	---	---	---	8.0	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
BrB2	Braddock clay loam, 2 to 8 percent slopes, eroded
CkA	Chewacla loam, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
CwA	Cullowhee fine sandy loam, 0 to 3 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
DoB	Dogue fine sandy loam, 1 to 6 percent slopes, rarely flooded
MaB2	Masada sandy clay loam, 2 to 8 percent slopes, eroded
MsB2	Masada gravelly sandy clay loam, 2 to 8 percent slopes, eroded
PcB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded
RzA	Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded
StB	State fine sandy loam, 1 to 6 percent slopes, rarely flooded
ToA	Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to plant[4]
BhC[5]:									
Bethlehem	3D	Slight	Slight	Slight	Moderate	Chestnut oak	64	47	Shortleaf pine, loblolly pine.
						Shortleaf pine	66	101	
						Virginia pine	75	115	
						Scarlet oak	73	55	
						White oak	---	---	
						Black oak	---	---	
Hibriten	3D	Slight	Slight	Moderate	Moderate	Chestnut oak	56	39	Eastern white pine, shortleaf pine.
						Virginia pine	61	93	
						Eastern white pine	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
						Pitch pine	---	---	
BrB2 Braddock	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar	90	90	Yellow-poplar, eastern white pine.
						Northern red oak	80	62	
						Eastern white pine	95	176	
BrD2 Braddock	5R	Moderate	Moderate	Moderate	Slight	Yellow-poplar	80	71	Eastern white pine, shortleaf pine.
						Northern red oak	70	52	
						Eastern white pine	85	155	
BuB Buncombe	8S	Slight	Moderate	Moderate	Slight	Yellow-poplar	100	107	Yellow-poplar, eastern white pine, American sycamore.
						American sycamore	---	---	
						Sweetgum	---	---	
						Hickory	---	---	
						Elm	---	---	
						River birch	---	---	
CdF Chandler	11R	Severe	Severe	Slight	Slight	Eastern white pine	88	162	Eastern white pine.
						Chestnut oak	76	58	
						Virginia pine	74	114	
						Pitch pine	67	104	
						Northern red oak	---	---	
						Scarlet oak	---	---	
						Hickory	---	---	
						Yellow-poplar	---	---	
						White oak	---	---	
CeD[5]:									
Chestnut	4R	Moderate	Moderate	Slight	Moderate	Chestnut oak	69	51	Eastern white pine, yellow-poplar.
						Eastern white pine	78	139	
						Northern red oak	80	62	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Black oak	71	53	
						Pitch pine	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to plant[4]
CeD[5]:									
Ashe	3R	Moderate	Moderate	Moderate	Moderate	Chestnut oak	57	40	Eastern white pine.
						Eastern white pine	81	146	
						Northern red oak	---	---	
						Pitch pine	57	84	
						Virginia pine	62	95	
						Scarlet oak	---	---	
CeF[5]:									
Chestnut	4R	Severe	Severe	Slight	Moderate	Chestnut oak	69	51	Eastern white pine, yellow-poplar.
						Eastern white pine	78	139	
						Northern red oak	80	62	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Black oak	71	53	
						Pitch pine	---	---	
Ashe	3R	Severe	Severe	Moderate	Moderate	Chestnut oak	57	40	Eastern white pine.
						Eastern white pine	81	146	
						Northern red oak	---	---	
						Pitch pine	57	84	
						Virginia pine	62	95	
						Scarlet oak	---	---	
ChD[5]:									
Chestnut	4R	Moderate	Moderate	Slight	Moderate	Chestnut oak	69	51	Eastern white pine, yellow-poplar.
						Eastern white pine	78	139	
						Northern red oak	80	62	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Black oak	71	53	
						Pitch pine	---	---	
Edneyville	4R	Moderate	Moderate	Slight	Slight	Northern red oak	83	65	Eastern white pine, yellow-poplar.
						Eastern white pine	90	166	
						Virginia pine	75	115	
						Yellow-poplar	98	104	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Black oak	---	---	
ChE[5]:									
Chestnut	4R	Severe	Severe	Slight	Moderate	Chestnut oak	69	51	Eastern white pine, yellow-poplar.
						Eastern white pine	78	139	
						Northern red oak	80	62	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Black oak	71	53	
						Pitch pine	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to plant[4]
ChE[5]:									
Edneyville	4R	Severe	Severe	Slight	Slight	Northern red oak	83	65	Eastern white pine, yellow-poplar.
						Eastern white pine	90	166	
						Virginia pine	75	115	
						Yellow-poplar	98	104	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Black oak	---	---	
CkA: Chewacla	7W	Slight	Moderate	Slight	Moderate	Yellow-poplar	95	98	Yellow-poplar, sweetgum, American sycamore, eastern white pine.
						Sweetgum	97	128	
						Water oak	80	62	
						Green ash	---	---	
						Blackgum	---	---	
						Red maple	---	---	
						Willow oak	---	---	
						American beech	---	---	
						American sycamore	---	---	
CrF[5]:									
Cleveland	2R	Severe	Severe	Moderate	Severe	Chestnut oak	45	30	Eastern white pine.
						Eastern white pine	70	121	
						Virginia pine	57	84	
						Pitch pine	---	---	
						Scarlet oak	---	---	
Rock outcrop.									
CsD[5]:									
Cowee	3R	Moderate	Moderate	Slight	Moderate	Chestnut oak	55	38	Eastern white pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	
Saluda	2D	Moderate	Moderate	Moderate	Severe	Chestnut oak	45	30	Virginia pine, eastern white pine.
						Eastern white pine	88	162	
						Pitch pine	68	105	
						Virginia pine	70	109	
CsE[5]:									
Cowee	3R	Severe	Severe	Slight	Moderate	Chestnut oak	55	38	Eastern white pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to plant[4]
CsE[5]:									
Saluda	2R	Severe	Severe	Moderate	Severe	Chestnut oak	45	30	Virginia pine, eastern white pine.
						Eastern white pine	88	162	
						Pitch pine	68	---	
						Virginia pine	70	109	
CuE Cullasaja	8R	Severe	Severe	Severe	Slight	Yellow-poplar	109	122	Yellow-poplar.
						Black cherry	---	---	
						Yellow birch	---	---	
						Northern red oak	92	74	
CwA Cullowhee	8W	Slight	Moderate	Slight	Slight	Yellow-poplar	103	112	Eastern white pine.
						Eastern white pine	100	186	
						American sycamore	---	---	
						Red maple	---	---	
						Yellow birch	---	---	
						Eastern hemlock	---	---	
DoB Dogue	7A	Slight	Moderate	Slight	Slight	Yellow-poplar	93	95	Loblolly pine, eastern white pine.
						Loblolly pine	90	131	
						Southern red oak	80	62	
						Sweetgum	90	106	
						White oak	80	62	
EdD Edneytown	10R	Moderate	Moderate	Moderate	Slight	Eastern white pine	80	144	Eastern white pine, yellow-poplar.
						Pitch pine	70	---	
						Virginia pine	70	109	
						Yellow-poplar	90	90	
						White oak	60	43	
						Southern red oak	60	43	
						Hickory	58	41	
ErC Evard	7A	Slight	Slight	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar.
						Pitch pine	70	109	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Southern red oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	
ErD Evard	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar.
						Pitch pine	70	109	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Southern red oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	
EsD[5]:									
Evard	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar.
						Pitch pine	70	109	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Southern red oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to plant[4]
EsD[5]:									
Cowee	3R	Moderate	Moderate	Slight	Moderate	Chestnut oak	55	38	Eastern white pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	
EsE[5]:									
Evard	7R	Severe	Severe	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar.
						Pitch pine	70	109	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Southern red oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	
Cowee	3R	Severe	Severe	Slight	Moderate	Chestnut oak	55	38	Eastern white pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	
GrD[5]:									
Greenlee	8X	Moderate	Moderate	Moderate	Slight	Yellow-poplar	101	109	Eastern white pine, yellow-poplar.
						Eastern hemlock	---	---	
						White oak	---	---	
						Northern red oak	---	---	
						Scarlet oak	---	---	
						Red maple	---	---	
						Pitch pine	---	---	
						Eastern white pine	98	182	
						Black locust	---	---	
						Virginia pine	---	---	
Ostin	8F	Slight	Slight	Moderate	Slight	Yellow-poplar	100	107	Eastern white pine, yellow-poplar, American sycamore, black walnut.
						American sycamore	---	---	
						River birch	---	---	
						Red maple	---	---	
						Black locust	---	---	
						Black cherry	---	---	
						Eastern hemlock	---	---	
						Virginia pine	---	---	
						Eastern white pine	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to plant[4]
HaC2 Hayesville	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar	85	81	Eastern white pine, shortleaf pine.
						Eastern white pine	77	137	
						Northern red oak	---	---	
						Pitch pine	78	119	
						Shortleaf pine	68	106	
						Virginia pine	70	109	
HbE Hibriten	3R	Moderate	Moderate	Moderate	Moderate	Chestnut oak	56	39	Eastern white pine, shortleaf pine.
						Virginia pine	61	93	
						Eastern white pine	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
						Pitch pine	---	---	
MaB2, MaC2 Masada	10C	Slight	Moderate	Moderate	Slight	Shortleaf pine	85	140	Loblolly pine, yellow-poplar, eastern white pine.
						Loblolly pine	80	110	
						Southern red oak	70	52	
						Virginia pine	70	109	
						Yellow-poplar	80	71	
						Eastern white pine	82	148	
MsB2, MsC2 Masada	8C	Slight	Moderate	Moderate	Slight	Shortleaf pine	70	110	Loblolly pine, yellow-poplar, eastern white pine.
						Loblolly pine	82	114	
						Southern red oak	70	52	
						Virginia pine	70	109	
						Yellow-poplar	85	81	
						Eastern white pine	80	144	
OsB Ostin	8F	Slight	Slight	Moderate	Slight	Yellow-poplar	100	107	Eastern white pine, yellow-poplar, American sycamore, black walnut.
						American sycamore	---	---	
						River birch	---	---	
						Red maple	---	---	
						Black locust	---	---	
						Black cherry	---	---	
						Eastern hemlock	---	---	
						Virginia pine	---	---	
						Eastern white pine	---	---	
PaD Pacolet	8R	Moderate	Moderate	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Loblolly pine	78	107	
						Yellow-poplar	90	90	
						Virginia pine	---	---	
						Hickory	---	---	
						White oak	---	---	
PcB2, PcC2 Pacolet	6C	Slight	Moderate	Moderate	Slight	Shortleaf pine	60	88	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Loblolly pine	70	93	
						Yellow-poplar	80	71	
						Scarlet oak	---	---	
						Hickory	---	---	
						Virginia pine	---	---	
PwD Porters	11R	Moderate	Moderate	Slight	Slight	Eastern white pine	89	164	Eastern white pine, yellow-poplar.
						Yellow-poplar	96	100	
						Virginia pine	80	88	
						Northern red oak	75	57	
						Hickory	---	---	
						Red maple	---	---	
						Black locust	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to plant[4]
RnD------------ Rion	8R	Moderate	Moderate	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Post oak------------	65	48	
						Southern red oak----	80	62	
						Sweetgum------------	80	79	
						White oak-----------	70	52	
						Yellow-poplar-------	90	90	
						Hickory-------------	---	---	
						Scarlet oak---------	---	---	
RnE------------ Rion	8R	Severe	Severe	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Southern red oak----	80	62	
						Sweetgum------------	80	79	
						White oak-----------	70	52	
						Yellow-poplar-------	90	90	
						Hickory-------------	---	---	
						Scarlet oak---------	---	---	
RsD[5]:									
Rion----------	8R	Moderate	Moderate	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Southern red oak----	80	62	
						Sweetgum------------	80	79	
						White oak-----------	70	52	
						Yellow-poplar-------	90	90	
						Hickory-------------	---	---	
						Scarlet oak---------	---	---	
Ashlar---------	6R	Moderate	Moderate	Severe	Moderate	Shortleaf pine------	60	88	Loblolly pine, shortleaf pine, eastern white pine.
						Virginia pine-------	60	91	
						Scarlet oak---------	---	---	
RwC[5]:									
Rion----------	8A	Slight	Slight	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Southern red oak----	80	62	
						Sweetgum------------	80	79	
						White oak-----------	70	52	
						Yellow-poplar-------	90	90	
						Hickory-------------	---	---	
						Scarlet oak---------	---	---	
Wedowee-------	8C	Slight	Moderate	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine, Virginia pine, shortleaf pine, yellow poplar, eastern white pine.
						Virginia pine-------	70	109	
						Southern red oak----	70	52	
						White oak-----------	65	48	
RzA[5]:									
Rosman--------	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	105	115	Yellow-poplar, eastern white pine, black walnut.
						Eastern white pine--	100	186	
						American sycamore---	---	---	
						Black walnut--------	---	---	
						Red maple-----------	---	---	
						River birch---------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to plant[4]
RzA[5]:									
Reddies	8A	Slight	Slight	Slight	Moderate	Yellow-poplar	105	115	Yellow-poplar, eastern white pine.
						American sycamore	---	---	
						Red maple	---	---	
						Eastern white pine	---	---	
						River birch	---	---	
StB: State	8A	Slight	Slight	Slight	Slight	Yellow-poplar	100	107	Loblolly pine, black walnut, yellow-poplar.
						Loblolly pine	86	123	
						Southern red oak	85	67	
						Virginia pine	85	130	
						Hickory	---	---	
						American beech	---	---	
						White oak	---	---	
TaD: Tate	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	92	93	Eastern white pine, yellow-poplar.
						Eastern white pine	89	164	
						Virginia pine	---	---	
						Northern red oak	---	---	
TcC[5]:									
Tate	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	92	93	Eastern white pine, yellow-poplar.
						Eastern white pine	89	164	
						Virginia pine	---	---	
						Northern red oak	---	---	
Cullowhee	8W	Slight	Moderate	Slight	Slight	Yellow-poplar	103	112	Eastern white pine.
						Eastern white pine	100	186	
						American sycamore	---	---	
						Red maple	---	---	
						Yellow birch	---	---	
						Eastern hemlock	---	---	
ToA: Toccoa	8A	Slight	Slight	Slight	Slight	Yellow-poplar	107	119	Loblolly pine, yellow-poplar, American sycamore.
						Loblolly pine	90	131	
						Sweetgum	100	138	
						Southern red oak	---	---	
						River birch	---	---	
						American sycamore	---	---	
WaC: Watauga	11A	Slight	Slight	Slight	Slight	Eastern white pine	87	159	Yellow-poplar, eastern white pine, northern red oak.
						Yellow-poplar	94	97	
						White oak	---	---	
						Hickory	---	---	
						Northern red oak	84	66	
						Virginia pine	---	---	
WaD: Watauga	11R	Moderate	Moderate	Slight	Slight	Eastern white pine	87	159	Yellow-poplar, eastern white pine, northern red oak.
						Yellow-poplar	94	97	
						White oak	---	---	
						Hickory	---	---	
						Northern red oak	84	66	
						Virginia pine	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to plant[4]
WeF[5]:									
Wateree-------	8R	Severe	Severe	Moderate	Moderate	Shortleaf pine------	69	108	Loblolly pine,
						Southern red oak----	72	54	Virginia pine,
						Yellow-poplar-------	84	79	yellow-poplar,
						Virginia pine-------	71	110	eastern white
						White oak-----------	68	50	pine.
Rion----------	8R	Severe	Severe	Slight	Slight	Shortleaf pine------	70	110	Loblolly pine,
						Southern red oak----	80	62	shortleaf
						Sweetgum------------	80	79	pine, yellow-
						White oak-----------	70	52	poplar,
						Yellow-poplar-------	90	90	eastern white
						Hickory-------------	---	---	pine.
WhA------------ Wehadkee	8W	Slight	Severe	Moderate	Moderate	Yellow-poplar-------	100	107	Yellow-poplar,
						Sweetgum------------	94	119	sweetgum.
						Willow oak----------	110	110	
						Water oak-----------	91	73	
						Green ash-----------	---	---	
						White ash-----------	---	---	
						American sycamore---	---	---	
						River birch---------	---	---	

[1] The number in the ordination symbol denotes potential productivity, in cubic meters per hectare per year, for a group or range of site indices for the indicator species (first tree listed under "Common trees"). One cubic meter per hectare per year equals 14.3 cubic feet per acre per year.

[2] Site indices were assigned using available plot data and comparison curves. If sufficient plot data was available, the site index was assigned based on data from soils with similar properties. The site index may vary considerably among sites with the same soil (especially in the mountains) because of the influence of climate, relief, landform position, aspect, drainage, and elevation.

[3] Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands. Cubic feet can be converted to board feet by multiplying by about 5.

[4] If hardwoods are desired on a forest site, the natural reproduction (seeds and sprouts) of acceptable species should be used. Special site preparation techniques may be needed. Planting hardwoods on a specific site should be based on the recommendations of a forester.

[5] See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BhC*:					
Bethlehem	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
Hibriten	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones.
BrB2 Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
BrD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BuB Buncombe	Severe: flooding.	Moderate: too sandy.	Moderate: too sandy, flooding.	Moderate: too sandy.	Severe: droughty.
CdF Chandler	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
CeD*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CeF*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ChD*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
ChE*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ChE*:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
CkA Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CrF*:					
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
CsD*:					
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Saluda	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
CsE*:					
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Saluda	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
CuE Cullasaja	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
CwA Cullowhee	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
DoB Dogue	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.
EdD Edneytown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
ErC Evard	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ErD: Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EsD*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EsE*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
GrD*:					
Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty, slope.
Ostin	Severe: flooding, large stones.	Severe: large stones.	Severe: small stones.	Slight	Severe: large stones.
HaC2: Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HbE: Hibriten	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, slope.
MaB2: Masada	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
MaC2: Masada	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
MsB2: Masada	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
MsC2: Masada	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
MuC*:					
Masada	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MuC*: Urban land.					
OsB: Ostin	Severe: flooding, large stones.	Severe: large stones.	Severe: small stones.	Slight	Severe: large stones.
PaD: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PcB2: Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
PcC2: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PrC*: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
PrD*: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land.					
Pt*. Pits					
PwD: Porters	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RnD: Rion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RnE: Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RsD*: Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ashlar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Slight	Severe: droughty, slope.
RwC*: Rion	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Rx*. Rock outcrop					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RzA*:					
Rosman	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Reddies	Severe: flooding.	Moderate: wetness.	Moderate: small stones, wetness.	Slight	Moderate: droughty, flooding.
StB State	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
TaD Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Slight.
TcC*:					
Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Slight.
Cullowhee	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
ToA Toccoa	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
UdC*, UfB*:					
Udorthents.					
Urban land.					
WaC Watauga	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
WaD Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
WeF*:					
Wateree	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WhA Wehadkee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
BhC*:										
Bethlehem	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Hibriten	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
BrB2 Braddock	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrD2 Braddock	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BuB Buncombe	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CdF Chandler	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CeD*:										
Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Ashe	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
CeF*:										
Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ashe	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
ChD*:										
Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Edneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ChE*:										
Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Edneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CkA Chewacla	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
CrF*:										
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
CsD*:										
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Saluda	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
CsE*:										
Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Saluda	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
CuE Cullasaja	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
CwA Cullowhee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
DoB Dogue	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EdD Edneytown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ErC Evard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ErD Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EsD*:										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EsE*:										
Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GrD*:										
Greenlee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ostin	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
HaC2 Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HbE Hibriten	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
MaB2: Masada	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC2: Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MsB2: Masada	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsC2: Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MuC*:										
Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
OsB: Ostin	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
PaD: Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PcB2: Pacolet	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PcC2: Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
PrC*:										
Pacolet	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										
PrD*:										
Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										
Pt*. Pits										
PwD: Porters	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RnD: Rion	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RnE: Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RsD*:										
Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ashlar	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
RwC*:										
Rion	Poor	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rx*. Rock outcrop										
RzA*:										
Rosman	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Very poor.
Reddies	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
StB State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaD Tate	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TcC*:										
Tate	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cullowhee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
ToA Toccoa	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UdC*, UfB*: Udorthents.										
Urban land.										
WaC Watauga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WaD Watauga	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WeF*:										
Wateree	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WhA Wehadkee	Very poor.	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BhC*:						
Bethlehem	Moderate: depth to rock, too clayey, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope.	Severe: small stones.
Hibriten	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: small stones.
BrB2 Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
BrD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
BuB Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
CdF Chandler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
CeD*, CeF*:						
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ashe	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
ChD*, ChE*:						
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CkA Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CrF*:						
Cleveland	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
CsD*, CsE*:						
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CsD*, CsE*:						
Saluda	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
CuE: Cullasaja	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones, slope.
CwA: Cullowhee	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
DoB: Dogue	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Moderate: wetness.
EdD: Edneytown	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ErC: Evard	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones.
ErD: Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EsD*, EsE*:						
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GrD*:						
Greenlee	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.
Ostin	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: large stones.
HaC2: Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
HbE: Hibriten	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: small stones, slope.
MaB2: Masada	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MaC2: Masada	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
MsB2: Masada	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, droughty.
MsC2: Masada	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, droughty, slope.
MuC*:						
Masada	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
Urban land.						
OsB: Ostin	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: large stones.
PaD: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PcB2: Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
PcC2: Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PrC*:						
Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Urban land.						
PrD*:						
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
Pt*. Pits						
PwD: Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RnD, RnE: Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RsD*:						
Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RsD*:						
Ashlar	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
RwC*:						
Rion	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Wedowee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Rx*. Rock outcrop						
RzA*:						
Rosman	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Reddies	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
StB State	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding.	Slight.
TaD Tate	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
TcC*:						
Tate	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
Cullowhee	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
ToA Toccoa	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
UdC*, UfB*: Udorthents.						
Urban land.						
WaC Watauga	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
WaD Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
WeF*:						
Wateree	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WeF*:						
Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WhA: Wehadkee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BhC*:					
Bethlehem	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Hibriten	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
BrB2 Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
BrD2 Braddock	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
BuB Buncombe	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
CdF Chandler	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
CeD*, CeF*:					
Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
ChD*, ChE*:					
Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
CkA Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CrF*:					
Cleveland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Rock outcrop.					
CsD*, CsE*:					
Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Saluda	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
CuE Cullasaja	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
CwA Cullowhee	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
DoB Dogue	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
EdD Edneytown	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
ErC Evard	Moderate: slope.	Severe: slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, small stones, slope.
ErD Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
EsD*, EsE*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
GrD*:					
Greenlee	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GrD*:					
Ostin	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
HaC2 Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
HbE Hibriten	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
MaB2 Masada	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MaC2 Masada	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
MsB2 Masada	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack, small stones.
MsC2 Masada	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, small stones.
MuC*:					
Masada	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land.					
OsB Ostin	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
PaD Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PcB2 Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
PcC2 Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PrC*:					
Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PrC*:					
Urban land.					
PrD*:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Urban land.					
Pt*. Pits					
PwD: Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
RnD, RnE: Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
RsD*:					
Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Ashlar	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
RwC*:					
Rion	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, slope.
Wedowee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
Rx*. Rock outcrop					
RzA*:					
Rosman	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
Reddies	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
StB: State	Moderate: flooding, wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: flooding, wetness.	Fair: too clayey, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TaD----------------- Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
TcC*:					
Tate---------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Cullowhee----------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
ToA----------------- Toccoa	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Good.
UdC*, UfB*: Udorthents.					
Urban land.					
WaC----------------- Watauga	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
WaD----------------- Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
WeF*:					
Wateree-------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Rion---------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
WhA----------------- Wehadkee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BhC*:				
Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Hibriten	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones.
BrB2 Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
BrD2 Braddock	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
BuB Buncombe	Good	Probable	Improbable: too sandy.	Poor: too sandy.
CdF Chandler	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CeD*:				
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Ashe	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
CeF*:				
Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Ashe	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
ChD*:				
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Edneyville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ChE*:				
Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CkA: Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CrF*:				
Cleveland	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
CsD*:				
Cowee	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
Saluda	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
CsE*:				
Cowee	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
Saluda	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
CuE: Cullasaja	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
CwA: Cullowhee	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
DoB: Dogue	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
EdD: Edneytown	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
ErC: Evard	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ErD: Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EsD*: Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cowee	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
EsE*: Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cowee	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones, slope.
GrD*: Greenlee	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Ostin	Fair: large stones, wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
HaC2: Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HbE: Hibriten	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones, thin layer.	Improbable: excess fines, large stones.	Poor: large stones, slope.
MaB2, MaC2: Masada	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
MsB2, MsC2: Masada	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
MuC*: Masada	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
Urban land.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
OsB Ostin	Fair: large stones, wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
PaD Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PcB2, PcC2 Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PrC*:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
PrD*:				
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Urban land.				
Pt*. Pits				
PwD Porters	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
RnD Rion	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RnE Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RsD*:				
Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ashlar	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines.	Poor: small stones.
RwC*:				
Rion	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Wedowee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rx*. Rock outcrop				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RzA*:				
Rosman	Fair: wetness.	Probable	Probable	Fair: small stones, area reclaim.
Reddies	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
StB State	Good	Probable	Improbable: too sandy.	Fair: too clayey.
TaD Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
TcC*:				
Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Cullowhee	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
ToA Toccoa	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
UdC*, UfB*:				
Udorthents.				
Urban land.				
WaC Watauga	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
WaD Watauga	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
WeF*:				
Wateree	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
WhA Wehadkee	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
BhC*:						
Bethlehem	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, soil blowing.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Hibriten	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
BrB2 Braddock	Severe: seepage.	Moderate: hard to pack.	Deep to water	Slope	Favorable	Favorable.
BrD2 Braddock	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope	Slope.
BuB Buncombe	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Too sandy, soil blowing.	Droughty, rooting depth.
CdF Chandler	Severe: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
CeD*, CeF*:						
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ashe	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
ChD*, ChE*:						
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Edneyville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
CkA Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
CrF*:						
Cleveland	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CsD*, CsE*:						
Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Saluda	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
CuE Cullasaja	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
CwA Cullowhee	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones, cutbanks cave.	Wetness, droughty, flooding.	Wetness, too sandy.	Droughty.
DoB Dogue	Moderate: seepage, slope.	Severe: wetness.	Slope	Wetness, soil blowing, slope.	Wetness, soil blowing.	Favorable.
EdD Edneytown	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope	Slope, too sandy.	Slope.
ErC, ErD Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope	Slope, too sandy.	Slope.
EsD*, EsE*:						
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope	Slope, too sandy.	Slope.
Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
GrD*:						
Greenlee	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Ostin	Severe: seepage.	Severe: seepage, large stones.	Flooding, large stones, slope.	Slope, large stones, wetness.	Large stones, wetness, too sandy.	Large stones, droughty.
HaC2 Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
HbE Hibriten	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
MaB2 Masada	Moderate: seepage, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, rooting depth.	Favorable	Rooting depth.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MaC2 Masada	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
MsB2 Masada	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope, droughty.	Favorable	Droughty.
MsC2 Masada	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
MuC*:						
Masada	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
Urban land.						
OsB Ostin	Severe: seepage.	Severe: seepage, large stones.	Flooding, large stones, slope.	Slope, large stones, wetness.	Large stones, wetness, too sandy.	Large stones, droughty.
PaD Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, soil blowing.	Slope.
PcB2 Pacolet	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
PcC2 Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
PrC*:						
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Urban land.						
PrD*:						
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, soil blowing.	Slope.
Urban land.						
Pt*. Pits						
PwD Porters	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
RnD, RnE Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty.
RsD*:						
Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
RsD*:						
Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
RwC*:						
Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty.
Wedowee	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Rx*. Rock outcrop						
RzA*:						
Rosman	Severe: seepage.	Severe: piping.	Flooding	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Favorable.
Reddies	Severe: seepage.	Severe: seepage.	Flooding, large stones, cutbanks cave.	Wetness, droughty.	Large stones, wetness, too sandy.	Large stones, droughty.
StB State	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Slope, soil blowing.	Soil blowing	Favorable.
TaD Tate	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
TcC*:						
Tate	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Cullowhee	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones, cutbanks cave.	Wetness, droughty, flooding.	Wetness, too sandy.	Droughty.
ToA Toccoa	Severe: seepage.	Severe: piping.	Flooding	Flooding	Favorable	Favorable.
UdC*, UfB*: Udorthents.						
Urban land.						
WaC, WaD Watauga	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope	Slope	Slope.
WeF*:						
Wateree	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
WeF*:						
Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty.
WhA Wehadkee	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BhC*:												
Bethlehem----	0-10	Gravelly sandy loam.	SM, GP-GM, GM, SP-SM	A-2-4, A-4, A-1	0	0-15	65-83	65-80	20-60	10-45	<35	NP-10
	10-15	Sandy clay loam, gravelly sandy clay loam.	SC, CL, GC, CL-ML	A-2, A-6, A-4, A-1	0	0-15	65-100	65-90	35-70	20-55	18-36	5-15
	15-30	Clay, clay loam, gravelly clay.	MH, CL, CH, ML	A-6, A-7	---	0-10	65-100	60-100	55-100	50-85	38-65	14-30
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Hibriten-----	0-12	Very cobbly sandy loam.	GM, SM	A-2, A-1, A-4	0-15	20-50	50-95	50-75	25-65	15-45	<35	NP-10
	12-30	Very cobbly clay loam, very cobbly sandy clay loam, very cobbly loam.	GC, CL, SC, GM-GC	A-6, A-4, A-2, A-1	0-15	20-50	40-95	50-90	20-80	10-70	<40	NP-15
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
BrB2, BrD2---- Braddock	0-6	Clay loam-----	CL	A-6, A-7	0	0-5	80-100	75-100	65-95	50-85	35-50	15-26
	6-42	Clay loam, clay, gravelly clay.	CH, CL, SC, GC	A-7, A-2	0	0-15	80-100	70-100	65-95	50-80	42-66	15-35
	42-60	Loam, very cobbly sandy clay loam, clay loam.	SC, CL, GM, GC	A-2, A-4, A-6, A-7	0	0-25	75-95	40-90	25-85	20-70	25-50	8-28
BuB----------- Buncombe	0-8	Loamy sand----	SM, SP-SM	A-2, A-3	0	0	98-100	88-100	88-97	7-32	15-25	NP
	8-60	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	0	98-100	92-100	90-100	7-32	15-25	NP
CdF----------- Chandler	0-6	Gravelly fine sandy loam.	SM	A-2-4, A-4, A-1, A-5	0-5	0-15	70-85	60-75	30-65	20-50	30-50	NP-7
	6-24	Loam, fine sandy loam, sandy loam.	ML, SM, MH	A-2, A-4, A-5	0-5	0-15	90-100	85-100	60-85	25-65	30-60	NP-7
	24-60	Loamy sand----	SM, SP-SM	A-2, A-3	0-5	0-15	75-100	70-100	50-70	15-40	<25	NP-4

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
CeD*, CeF*:												
Chestnut-----	0-10	Gravelly sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-5	5-15	75-95	65-90	60-85	30-49	<50	NP-7
	10-32	Gravelly loam, gravelly fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	32-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Ashe---------	0-4	Gravelly sandy loam.	SM, SC-SM	A-2, A-4	0-5	5-10	80-90	65-90	60-90	30-49	25-35	NP-7
	4-25	Gravelly sandy loam, sandy loam, fine sandy loam.	SM, SC-SM	A-4	0-2	5-20	85-100	65-95	60-95	35-49	25-35	NP-7
	25-35	Gravelly sandy loam, cobbly sandy loam, sandy loam, loamy sand.	SM	A-2, A-4	0-2	5-20	75-95	65-95	55-95	15-49	<25	NP
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
ChD*, ChE*:												
Chestnut-----	0-10	Gravelly sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-5	5-15	75-95	65-90	60-85	30-49	<50	NP-7
	10-32	Gravelly loam, gravelly fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	32-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Edneyville---	0-5	Gravelly sandy loam.	SM, SC-SM, ML, MH	A-2, A-4, A-5	0-2	0-10	75-95	65-80	60-75	30-52	25-61	NP-7
	5-27	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4, A-5	0-2	0-5	85-100	80-100	65-95	30-68	25-45	NP-10
	27-60	Sandy loam, gravelly sandy loam, fine sandy loam, loamy sand.	SM, SC-SM	A-2, A-4, A-5	0-2	0-10	75-100	65-100	40-88	15-49	25-45	NP-10
CkA----------- Chewacla	0-8	Loam----------	ML, CL, CL-ML	A-4, A-6, A-7	0	0	98-100	95-100	70-100	55-90	25-49	4-20
	8-18	Silt loam, silty clay loam, clay loam.	ML, CL	A-4, A-6, A-7	0	0	96-100	95-100	80-100	51-98	30-49	4-22
	18-30	Sandy clay loam, loam, sandy loam.	SM, SC-SM, ML, CL	A-4, A-7-6, A-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
	30-60	Silt loam, clay loam, silty clay loam.	ML, MH, CL, CH	A-4, A-6, A-7	0	0	85-100	75-100	60-100	51-98	22-61	4-28

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
CrF*:												
Cleveland----	0-14	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-10	2-10	65-90	50-80	45-75	20-40	<25	NP-3
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
CsD*, CsE*:												
Cowee--------	0-12	Gravelly sandy loam.	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	12-30	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-2	0-15	75-99	65-90	60-85	35-70	26-56	5-22
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Saluda-------	0-6	Gravelly sandy loam.	SM	A-2	0-5	0-15	65-85	60-80	55-75	15-35	<30	NP-4
	6-18	Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam.	SM, SC-SM, SC	A-2, A-4, A-6	0-5	0-15	65-85	50-75	40-70	35-65	20-38	3-15
	18-40	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
CuE----------- Cullasaja	0-14	Very cobbly sandy loam.	SM, SP-SM, GM, GP-GM	A-1, A-2-5	20-40	30-50	55-80	50-75	35-55	15-25	41-70	NP-7
	14-60	Very cobbly sandy loam, very cobbly fine sandy loam, very cobbly loam.	SM, GM	A-1-b, A-2-4	20-40	30-50	55-85	50-75	35-60	15-30	<40	NP-7
CwA----------- Cullowhee	0-12	Fine sandy loam.	SM, ML	A-2-4, A-4	0	0-5	90-100	80-100	50-97	25-55	<35	NP-4
	12-31	Loamy sand, loamy fine sand, sandy loam, fine sandy loam.	SM, SP-SM	A-2-4, A-1-b	0	0-5	90-100	85-95	40-89	10-55	<25	NP-4
	31-60	Extremely gravelly sand, very gravelly sand, very cobbly sand.	GP-GM, GM, SM, SP-SM	A-1	0-5	10-50	13-75	10-55	6-40	1-15	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
DoB----------- Dogue	0-8	Fine sandy loam.	SM, SC, SC-SM	A-2, A-4	0	0	95-100	75-100	50-100	20-50	<25	NP-10
	8-52	Clay loam, clay, sandy clay.	CL, CH, SC	A-6, A-7	0	0	95-100	75-100	65-100	40-90	35-60	16-40
	52-60	Sandy clay loam.	CL, SC, ML	A-4, A-6, A-7	0	0-14	90-100	70-100	60-100	30-60	30-45	7-18
EdD----------- Edneytown	0-8	Gravelly sandy loam.	SM	A-2	0-5	0-15	65-85	60-80	55-70	15-35	<30	NP-4
	8-30	Sandy clay loam, clay loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	0-5	90-100	85-100	60-95	35-70	25-40	5-15
	30-39	Sandy loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0	0-5	80-100	75-100	60-85	30-55	<25	NP-9
	39-60	Loamy sand, sandy loam.	SM, SC-SM	A-2, A-4	0	0-15	75-100	70-100	50-70	15-40	<25	NP-7
ErC, ErD------ Evard	0-8	Gravelly sandy loam.	SM	A-2	0-5	0-15	65-85	60-80	55-75	15-35	<30	NP-4
	8-26	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	26-36	Sandy loam, loam, sandy clay loam.	SC-SM, ML, CL, SC-SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	36-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	---	NP
EsD*, EsE*:												
Evard--------	0-8	Gravelly sandy loam.	SM	A-2	0-5	0-15	65-85	60-80	55-75	15-35	<30	NP-4
	8-26	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	26-36	Sandy loam, loam, sandy clay loam.	SC-SM, ML, CL, SC-SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	36-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	---	NP
Cowee--------	0-12	Gravelly sandy loam.	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	12-30	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-2	0-15	75-99	65-90	60-85	35-70	26-56	5-22
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
GrD*:												
Greenlee-----	0-8	Very cobbly sandy loam.	GM, SM	A-2-4, A-4, A-1-b	5-20	20-55	50-75	50-70	30-60	20-45	<30	NP-7
	8-40	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-2-4, A-4, A-1-b	5-35	10-55	50-80	50-75	30-60	20-40	<30	NP-7
	40-60	Very cobbly sandy loam, very cobbly loamy sand.	GM, SM	A-2-4, A-4, A-1-b	5-35	10-55	50-80	45-75	30-60	15-40	<30	NP-7
Ostin---------	0-4	Very cobbly loamy sand.	SM	A-1-b, A-2-4	0	15-45	80-95	70-85	40-70	15-30	<30	NP-3
	4-60	Very gravelly loamy sand, very gravelly sand, very cobbly loamy sand, very cobbly coarse sand.	SM, SW, SW-SM, SP-SM	A-1-a, A-1-b	0-15	15-45	60-75	40-55	8-50	1-20	---	NP
HaC2---------- Hayesville	0-8	Sandy clay loam.	CL, SC, ML	A-4, A-6, A-7	0	0-5	90-100	85-100	80-95	45-65	30-50	7-18
	8-40	Clay loam, clay.	ML, MH, CL, CH	A-6, A-7	0	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	40-58	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	58-60	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	0	0-5	90-100	90-95	65-90	40-55	25-40	NP-12
HbE----------- Hibriten	0-12	Very cobbly sandy loam.	GM, SM	A-2, A-1, A-4	0-15	20-50	50-95	50-75	25-65	15-45	<35	NP-10
	12-30	Very cobbly clay loam, very cobbly sandy clay loam, very cobbly loam.	GC, CL, SC, GM-GC	A-6, A-4, A-2, A-1	0-15	20-50	50-95	50-70	20-80	10-70	<40	NP-15
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
MaB2, MaC2---- Masada	0-8	Sandy clay loam.	CL	A-6	0	0-5	90-100	85-100	60-93	30-58	25-40	8-25
	8-42	Clay loam, clay, gravelly clay.	CH, CL	A-7, A-6	0	0-10	80-100	70-100	65-96	50-80	35-60	15-35
	42-60	Loam, clay loam, gravelly sandy clay loam, sandy clay loam.	CL, ML, MH	A-6, A-7, A-4	0	0-10	80-100	70-100	65-95	50-80	30-52	7-20
MsB2, MsC2---- Masada	0-8	Gravelly sandy clay loam.	CL, GC, SC	A-6	0-1	0-5	65-85	50-75	40-70	36-55	30-40	15-25
	8-42	Gravelly clay loam, gravelly clay, clay.	GC, CL, CH	A-7	0-1	0-10	55-85	50-80	40-75	35-65	45-65	20-35
	42-60	Gravelly clay loam, cobbly clay loam, clay loam, sandy clay loam.	GC, CL, SC	A-6, A-7	0-2	0-10	55-85	50-80	40-75	35-65	30-45	15-25
MuC*:												
Masada-------	0-8	Sandy clay loam.	CL	A-6	0	0-5	90-100	80-100	60-90	30-55	30-40	15-25
	8-42	Clay loam, clay, gravelly clay.	CH, CL	A-7, A-6	0	0-10	80-100	70-100	65-95	50-80	35-60	15-35
	42-60	Loam, clay loam, gravelly sandy clay loam, sandy clay loam.	CL, ML	A-6, A-7, A-4	0	0-10	80-100	70-100	65-95	50-80	30-45	7-20
Urban land.												
OsB----------- Ostin	0-4	Very cobbly loamy sand.	SM	A-1-b, A-2-4	0	15-45	80-95	70-85	40-70	15-30	<30	NP-3
	4-60	Very gravelly loamy sand, very gravelly sand, very cobbly coarse sand, very cobbly loamy sand.	SM, SW, SW-SM, SP-SM	A-1-a, A-1-b	0-15	15-45	60-75	40-55	8-50	1-20	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PaD----------- Pacolet	0-8	Sandy loam----	SM, SC-SM	A-2, A-1-b, A-4	0-1	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	8-23	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	23-31	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	80-100	70-100	60-98	30-60	20-35	5-15
	31-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4, A-5	0-1	0-2	80-100	70-100	60-98	25-50	<43	NP-7
PcB2, PcC2---- Pacolet	0-8	Sandy clay loam.	SC-SM, SC, ML	A-4, A-6, A-7	0-1	0-1	95-100	90-100	65-89	36-61	20-42	4-17
	8-23	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-79	38-65	11-33
	23-31	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	80-100	70-100	60-98	30-74	20-35	5-15
	31-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM, ML	A-4, A-2-4, A-5	0-1	0-2	80-100	70-100	60-98	25-74	<43	NP-7
PrC*: Pacolet------	0-8	Sandy clay loam.	SC-SM, SC, ML	A-4, A-6, A-7	0-1	0-1	95-100	90-100	65-89	36-61	20-42	4-17
	8-23	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-79	38-65	11-33
	23-31	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	80-100	70-100	60-98	30-74	20-35	5-15
	31-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM, ML	A-4, A-2-4, A-5	0-1	0-2	80-100	70-100	60-98	25-74	<43	NP-7
Urban land.												
PrD*: Pacolet------	0-8	Sandy loam----	SM, SC-SM	A-2, A-1-b, A-4	0-1	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	8-23	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	23-31	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	80-100	70-100	60-98	30-60	20-35	5-15
	31-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4, A-5	0-1	0-2	80-100	70-100	60-98	25-50	<43	NP-7
Urban land.												

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
Pt*. Pits												
PwD----------- Porters	0-9	Loam----------	ML, CL, CL-ML	A-4	0-2	0-5	85-100	80-100	70-80	51-65	<35	NP-10
	9-39	Loam, sandy loam, fine sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0-5	5-25	75-99	60-99	50-90	30-70	<25	NP-7
	39-57	Loamy sand----	SM, SP-SM	A-2, A-3	0-5	0-15	75-99	60-99	50-70	15-40	<25	NP-4
	57-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
RnD, RnE------ Rion	0-8	Fine sandy loam.	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	8-30	Sandy loam, sandy clay loam, clay loam.	SC, SC-SM, CL-ML, CL	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SC-SM	A-2, A-4, A-6	0-1	0-2	90-100	80-100	60-85	15-50	<36	NP-12
RsD*:												
Rion---------	0-8	Fine sandy loam.	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	8-30	Sandy loam, sandy clay loam, clay loam.	SC, SC-SM, CL-ML, CL	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SC-SM	A-2, A-4, A-6	0-1	0-2	90-100	80-100	60-85	15-50	<36	NP-12
Ashlar-------	0-8	Gravelly sandy loam.	GM-GC, SC-SM, GM, SM	A-2, A-4, A-1	0-2	0-15	70-90	65-75	40-70	20-50	<25	NP-6
	8-30	Sandy loam, fine sandy loam, gravelly sandy loam, coarse sandy loam.	GM-GC, SC-SM, GM, SM	A-1, A-2, A-4	0-5	0-15	70-100	65-100	40-75	15-50	<25	NP-6
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
RwC*:												
Rion---------	0-8	Fine sandy loam.	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	8-30	Sandy loam, sandy clay loam, clay loam.	SC, SC-SM, CL-ML, CL	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SC-SM	A-2, A-4, A-6	0-1	0-2	90-100	80-100	60-85	15-50	<36	NP-12

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
RwC*:												
Wedowee	0-5	Sandy loam	SM, SC-SM	A-4, A-2-4	0	0	95-100	80-100	50-99	23-50	<30	NP-6
	5-23	Sandy clay, clay loam, clay.	SC, ML, CL, MH	A-6, A-7	0	0	95-100	95-100	65-97	45-75	28-58	5-30
	23-60	Sandy clay loam, clay loam, sandy loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	0	85-100	80-100	60-80	30-60	20-54	5-25
Rx*. Rock outcrop												
RzA*:												
Rosman	0-12	Fine sandy loam.	ML, SM, SC-SM	A-2-4, A-4, A-2-5	0	0	95-100	90-100	75-100	30-60	<41	NP-7
	12-60	Loam, fine sandy loam, sandy loam.	ML, SM, SC-SM	A-2-4, A-4	0	0-15	95-100	90-100	75-100	30-85	<39	NP-8
Reddies	0-10	Fine sandy loam.	SM, ML	A-2-4, A-4	0	0-5	90-100	80-100	50-95	25-55	25-37	NP-7
	10-29	Fine sandy loam, sandy loam, gravelly sandy loam.	SM, ML	A-2-4, A-4, A-1-b	0-1	0-15	70-100	60-95	30-85	15-55	25-35	NP-7
	29-60	Extremely gravelly sand, very gravelly sand, very cobbly sand.	GM, GP-GM, SM, SP-SM	A-1	0-5	10-50	13-75	10-55	4-40	1-15	<25	NP
StB State	0-20	Fine sandy loam.	SM, ML, CL-ML, SC-SM	A-2, A-4	0	0	95-100	95-100	45-85	25-55	<28	NP-7
	20-38	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	0	95-100	95-100	75-100	35-80	24-40	8-22
	38-72	Stratified sand to fine sandy loam.	SM, SC-SM, SP-SM	A-1, A-2, A-3, A-4	0	0-10	85-100	60-100	40-90	5-50	<25	NP-7
TaD Tate	0-9	Fine sandy loam.	ML, SM	A-4, A-6	0	0-5	96-100	86-98	68-98	40-80	<38	NP-13
	9-43	Clay loam, sandy clay loam, loam.	CL, ML, CL-ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	43-60	Gravelly fine sandy loam, cobbly fine sandy loam, fine sandy loam.	GM, GM-GC, SM, SC-SM	A-4, A-2-4, A-2-6	0-10	5-35	40-100	40-90	35-60	30-50	<35	NP-13

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
TcC*:												
Tate	0-9	Fine sandy loam.	ML, SM	A-4, A-6	0	0-5	96-100	86-98	68-98	40-80	<38	NP-13
	9-43	Clay loam, sandy clay loam, loam.	CL, ML, CL-ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	43-60	Gravelly fine sandy loam, cobbly fine sandy loam, fine sandy loam.	GM, GM-GC, SM, SC-SM	A-4, A-2-4, A-2-6	0-10	5-35	40-100	40-90	35-60	30-50	<35	NP-13
Cullowhee	0-12	Fine sandy loam.	SM, ML	A-2-4, A-4	0	0-5	90-100	80-100	50-97	25-55	<35	NP-4
	12-31	Loamy sand, loamy fine sand, sandy loam, fine sandy loam.	SM, SP-SM	A-2-4, A-1-b	0	0-5	90-100	85-95	40-89	10-55	<25	NP-4
	31-60	Extremely gravelly sand, very gravelly sand, very cobbly sand.	GP-GM, GM, SM, SP-SM	A-1	0-5	10-50	13-75	10-55	6-40	1-15	---	NP
ToA Toccoa	0-8	Sandy loam	SM, ML	A-2, A-4	0	0	95-100	95-100	50-99	30-55	<30	NP-4
	8-60	Sandy loam, loam.	SM, ML	A-2, A-4	0	0	95-100	90-100	60-100	30-55	<30	NP-4
UdC*, UfB*: Udorthents.												
Urban land.												
WaC, WaD Watauga	0-5	Loam	SM, SC-SM, SC, ML	A-4	0-2	0-15	90-100	90-98	70-90	36-65	<35	NP-10
	5-26	Clay loam, loam, sandy clay loam.	SC, CL	A-6, A-7	0	0-15	85-100	85-98	75-95	40-75	30-65	12-25
	26-60	Loam, sandy loam, fine sandy loam.	SM	A-2, A-4	0	0-15	75-100	70-95	60-90	15-50	10-40	NP-12
WeF*:												
Wateree	0-4	Sandy loam	SM	A-2, A-4	0-1	0-5	85-100	75-98	50-80	25-40	<30	NP-7
	4-22	Coarse sandy loam, sandy loam.	SM	A-2	0	0-5	80-100	75-95	45-80	25-35	<30	NP-7
	22-34	Sand, loamy sand, sandy loam.	SP-SM, SM	A-1, A-2, A-3	0-1	0-5	70-100	65-98	40-80	5-35	<25	NP-3
	34-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
WeF*:												
Rion---------	0-8	Fine sandy loam.	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	8-30	Sandy loam, sandy clay loam, clay loam.	SC, SC-SM, CL-ML, CL	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SC-SM	A-2, A-4, A-6	0-1	0-2	90-100	80-100	60-85	15-50	<36	NP-12
WhA----------- Wehadkee	0-6	Loam----------	SM, SC, SC-SM	A-2, A-4	0	0	100	95-100	60-90	30-50	<30	NP-10
	6-32	Sandy clay loam, silt loam, clay loam, loam.	CL, CL-ML, ML, SC	A-6, A-7, A-4	0	0	100	99-100	85-100	45-98	20-58	6-25
	32-60	Variable------	---	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
BhC*:											
Bethlehem	0-10	7-20	1.40-1.65	2.0-6.0	0.06-0.10	4.5-5.5	Low	0.15	2	3	1-3
	10-15	20-35	1.40-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.24			
	15-30	35-60	1.25-1.50	0.6-2.0	0.12-0.15	4.5-5.5	Low	0.28			
	30-60	---	---	---	---	---	-------------	----			
Hibriten	0-12	7-20	1.20-1.65	2.0-6.0	0.04-0.06	4.5-5.5	Low	0.10	2	3	.5-2
	12-30	10-35	1.25-1.60	0.6-2.0	0.05-0.09	4.5-5.5	Low	0.10			
	30-60	---	---	---	---	---	-------------	----			
BrB2, BrD2 Braddock	0-6	27-40	1.20-1.50	0.6-2.0	0.14-0.19	4.5-6.5	Low	0.32	3	8	.5-1
	6-42	35-55	1.20-1.50	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	0.24			
	42-60	20-45	1.20-1.50	0.6-6.0	0.06-0.12	4.5-5.5	Low	0.24			
BuB Buncombe	0-8	3-12	1.60-1.75	>6.0	0.06-0.10	4.5-6.5	Low	0.10	5	2	.5-1
	8-60	3-12	1.60-1.75	>6.0	0.03-0.07	4.5-6.0	Low	0.10			
CdF Chandler	0-6	5-18	1.30-1.50	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.28	3	3	1-8
	6-24	5-18	1.30-1.50	2.0-6.0	0.11-0.15	4.5-6.0	Low	0.32			
	24-60	3-12	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.32			
CeD*, CeF*:											
Chestnut	0-10	5-20	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.17	2	5	1-8
	10-32	5-25	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.15			
	32-60	---	---	---	---	---	-------------	----			
Ashe	0-4	7-20	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low	0.17	2	5	1-5
	4-25	7-20	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.17			
	25-35	5-15	1.45-1.65	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.17			
	35	---	---	---	---	---	-------------	----			
ChD*, ChE*:											
Chestnut	0-10	5-20	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.17	2	5	1-8
	10-32	5-25	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.15			
	32-60	---	---	---	---	---	-------------	----			
Edneyville	0-5	5-18	1.40-1.60	2.0-6.0	0.08-0.13	4.5-6.0	Low	0.17	4	5	1-8
	5-27	7-20	1.40-1.60	2.0-6.0	0.10-0.16	4.5-6.0	Low	0.20			
	27-60	5-20	1.40-1.60	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.20			
CkA Chewacla	0-8	10-25	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	5	1-4
	8-18	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32			
	18-30	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low	0.28			
	30-60	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-7.3	Low	0.32			
CrF*:											
Cleveland	0-14	6-20	1.20-1.50	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17	1	8	5-8
	14	---	---	---	---	---	-------------	----			
Rock outcrop.											
CsD*, CsE*:											
Cowee	0-12	8-20	1.25-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.20	2	5	1-5
	12-30	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.24			
	30-60	---	---	---	---	---	-------------	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
CsD*, CsE*:											
Saluda----------	0-6	5-20	1.20-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.15	2	8	.5-2
	6-18	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.5	Low----------	0.20			
	18-40	---	---	---	---	---	-------------	----			
CuE------------- Cullasaja	0-14	5-20	0.50-1.20	2.0-6.0	0.07-0.10	4.5-6.0	Low----------	0.02	5	8	5-18
	14-60	5-20	1.00-1.60	2.0-6.0	0.07-0.10	4.5-6.0	Low----------	0.05			
CwA------------- Cullowhee	0-12	5-18	1.30-1.50	2.0-6.0	0.12-0.18	4.5-6.5	Low----------	0.20	3	3	3-10
	12-31	5-12	1.35-1.55	2.0-6.0	0.05-0.10	4.5-6.5	Low----------	0.10			
	31-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-6.5	Low----------	0.05			
DoB------------- Dogue	0-8	5-20	1.35-1.50	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.28	5	3	.5-1
	8-52	35-50	1.45-1.60	0.2-0.6	0.12-0.19	4.5-5.5	Moderate-----	0.28			
	52-60	20-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.17			
EdD------------- Edneytown	0-8	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.15	5	8	1-3
	8-30	18-35	1.30-1.40	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.24			
	30-39	10-22	1.30-1.50	0.6-2.0	0.11-0.14	4.5-5.5	Low----------	0.24			
	39-60	4-15	1.30-1.50	2.0-6.0	0.06-0.12	4.5-5.5	Low----------	0.17			
ErC, ErD--------- Evard	0-8	5-20	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.15	5	8	1-5
	8-26	18-35	1.30-1.50	0.6-2.0	0.15-0.18	4.5-6.0	Low----------	0.24			
	26-36	12-30	1.20-1.40	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.24			
	36-60	5-20	1.20-1.40	0.6-2.0	0.05-0.17	4.5-6.0	Low----------	0.24			
EsD*, EsE*:											
Evard-----------	0-8	5-20	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.15	5	8	1-5
	8-26	18-35	1.30-1.50	0.6-2.0	0.15-0.18	4.5-6.0	Low----------	0.24			
	26-36	12-30	1.20-1.40	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.24			
	36-60	5-20	1.20-1.40	0.6-2.0	0.05-0.17	4.5-6.0	Low----------	0.24			
Cowee-----------	0-12	8-20	1.25-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.20	2	5	1-5
	12-30	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.24			
	30-60	---	---	---	---	---	-------------	----			
GrD*:											
Greenlee--------	0-8	5-20	1.30-1.50	2.0-6.0	0.06-0.11	4.5-6.0	Low----------	0.10	5	8	2-5
	8-40	5-20	1.40-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.10			
	40-60	1-18	1.40-1.60	2.0-6.0	0.04-0.10	4.5-6.0	Low----------	0.10			
Ostin-----------	0-4	5-15	1.20-1.50	>6.0	0.02-0.05	4.5-7.3	Low----------	0.15	2	2	1-3
	4-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low----------	0.05			
HaC2------------ Hayesville	0-8	20-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.24	5	5	1-3
	8-40	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.24			
	40-58	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.20			
	58-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.17			
HbE------------- Hibriten	0-12	7-20	1.20-1.65	2.0-6.0	0.04-0.06	4.5-5.5	Low----------	0.10	2	3	.5-2
	12-30	10-35	1.25-1.60	0.6-2.0	0.05-0.09	4.5-5.5	Low----------	0.10			
	30-60	---	---	---	---	---	-------------	----			
MaB2, MaC2------- Masada	0-8	20-35	1.45-1.55	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24	4	6	1-3
	8-42	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24			
	42-60	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MsB2, MsC2-------- Masada	0-8	20-35	1.45-1.55	0.6-2.0	0.08-0.14	4.5-5.5	Moderate-----	0.24	4	6	.5-2
	8-42	35-55	1.30-1.60	0.6-2.0	0.07-0.14	4.5-5.5	Moderate-----	0.24			
	42-60	30-40	1.30-1.60	0.6-2.0	0.07-0.14	4.5-5.5	Moderate-----	0.24			
MuC*:											
Masada----------	0-8	20-35	1.45-1.55	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24	4	6	1-3
	8-42	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24			
	42-60	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24			
Urban land.											
OsB-------------- Ostin	0-4	5-15	1.20-1.50	>6.0	0.02-0.05	4.5-7.3	Low----------	0.15	2	2	1-3
	4-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low----------	0.05			
PaD-------------- Pacolet	0-8	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.20	3	3	.5-2
	8-23	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28			
	23-31	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
	31-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
PcB2, PcC2-------- Pacolet	0-8	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.24	2	5	.5-1
	8-23	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28			
	23-31	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
	31-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
PrC*:											
Pacolet---------	0-8	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.24	2	5	.5-1
	8-23	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28			
	23-31	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
	31-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
Urban land.											
PrD*:											
Pacolet---------	0-8	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.20	3	3	.5-2
	8-23	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28			
	23-31	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
	31-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28			
Urban land.											
Pt*. Pits											
PwD-------------- Porters	0-9	10-25	1.40-1.60	2.0-6.0	0.16-0.20	4.5-6.5	Low----------	0.28	3	5	3-8
	9-39	7-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-6.5	Low----------	0.24			
	39-57	3-12	1.40-1.60	>6.0	0.06-0.10	4.5-6.5	Low----------	0.20			
	57-60	---	---	---	---	---	-------------	----			
RnD, RnE--------- Rion	0-8	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.24	3	3	.5-2
	8-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low----------	0.20			
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low----------	0.20			
RsD*:											
Rion------------	0-8	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.24	3	3	.5-2
	8-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low----------	0.20			
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low----------	0.20			
Ashlar----------	0-8	5-15	1.30-1.55	2.0-6.0	0.04-0.14	4.5-6.0	Low----------	0.24	2	3	.5-1
	8-30	5-15	1.30-1.55	2.0-6.0	0.04-0.14	4.5-5.5	Low----------	0.24			
	30	---	---	---	---	---	-------------	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RwC*:											
Rion------------	0-8	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.24	3	3	.5-2
	8-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low-----------	0.20			
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low-----------	0.20			
Wedowee---------	0-5	5-20	1.25-1.60	2.0-6.0	0.10-0.18	4.5-5.5	Low-----------	0.24	3	3	.5-3
	5-23	35-45	1.30-1.50	0.6-2.0	0.12-0.18	4.5-5.5	Low-----------	0.28			
	23-60	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-5.5	Low-----------	0.28			
Rx*. Rock outcrop											
RzA*:											
Rosman----------	0-12	8-18	1.25-1.40	2.0-6.0	0.12-0.18	5.1-6.5	Low-----------	0.24	5	3	2-8
	12-60	8-18	1.25-1.50	2.0-6.0	0.10-0.18	5.1-6.5	Low-----------	0.24			
Reddies---------	0-10	5-18	1.30-1.50	2.0-6.0	0.10-0.18	4.5-7.3	Low-----------	0.20	3	3	3-8
	10-29	5-18	1.35-1.55	2.0-6.0	0.08-0.15	4.5-7.3	Low-----------	0.10			
	29-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low-----------	0.05			
StB-------------- State	0-20	5-20	1.25-1.40	0.6-6.0	0.08-0.15	4.5-5.5	Low-----------	0.28	5	3	<2
	20-38	18-34	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low-----------	0.28			
	38-72	2-15	1.35-1.50	>2.0	0.02-0.10	4.5-6.5	Low-----------	0.17			
TaD-------------- Tate	0-9	5-20	1.35-1.60	2.0-6.0	0.17-0.19	4.5-6.5	Low-----------	0.24	5	5	1-3
	9-43	18-35	1.30-1.45	0.6-2.0	0.17-0.19	4.5-6.5	Low-----------	0.28			
	43-60	5-25	1.35-1.60	2.0-6.0	0.12-0.15	4.5-6.5	Low-----------	0.17			
TcC*:											
Tate------------	0-9	5-20	1.35-1.60	2.0-6.0	0.17-0.19	4.5-6.5	Low-----------	0.24	5	5	1-3
	9-43	18-35	1.30-1.45	0.6-2.0	0.17-0.19	4.5-6.5	Low-----------	0.28			
	43-60	5-25	1.35-1.60	2.0-6.0	0.12-0.15	4.5-6.5	Low-----------	0.17			
Cullowhee-------	0-12	5-18	1.30-1.50	2.0-6.0	0.12-0.18	4.5-6.5	Low-----------	0.20	3	3	3-10
	12-31	5-12	1.35-1.55	2.0-6.0	0.05-0.10	4.5-6.5	Low-----------	0.10			
	31-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-6.5	Low-----------	0.05			
ToA-------------- Toccoa	0-8	2-15	1.40-1.55	2.0-6.0	0.09-0.12	5.1-6.5	Low-----------	0.10	4	3	1-2
	8-60	2-19	1.40-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low-----------	0.20			
UdC*, UfB*: Udorthents.											
Urban land.											
WaC, WaD--------- Watauga	0-5	7-25	1.35-1.55	2.0-6.0	0.13-0.17	4.5-6.0	Low-----------	0.24	3	5	1-5
	5-26	15-35	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.28			
	26-60	5-20	1.30-1.50	0.6-2.0	0.08-0.12	4.5-6.0	Low-----------	0.24			
WeF*:											
Wateree---------	0-4	5-18	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low-----------	0.20	3	3	<1
	4-22	5-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low-----------	0.20			
	22-34	2-15	1.40-1.70	2.0-6.0	0.04-0.12	4.5-6.0	Low-----------	0.17			
	34-60	---	---	---	---	---	--------------	----			
Rion------------	0-8	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.24	3	3	.5-2
	8-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low-----------	0.20			
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low-----------	0.20			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
WhA-------------- Wehadkee	0-6	7-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	5	3	2-5
	6-32	18-35	1.30-1.50	0.6-2.0	0.16-0.20	4.5-6.5	Low----------	0.32			
	32-60	---	---	---	---	---	-------------	----			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
BhC*:												
Bethlehem	B	None	---	---	>6.0	---	---	20-40	Soft	---	Moderate	High.
Hibriten	B	None	---	---	>6.0	---	---	20-40	Soft	---	Moderate	High.
BrB2, BrD2 Braddock	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
BuB Buncombe	A	Occasional	Very brief	Feb-Jun	>6.0	---	---	>60	---	---	Low	Moderate.
CdF Chandler	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
CeD*, CeF*:												
Chestnut	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Ashe	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	High.
ChD*, ChE*:												
Chestnut	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Edneyville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
CkA Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	---	High	Moderate.
CrF*:												
Cleveland	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	High.
Rock outcrop.												
CsD*, CsE*:												
Cowee	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
Saluda	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
CuE Cullasaja	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	High.
CwA Cullowhee	B/D	Frequent	Very brief	Jan-Dec	1.5-2.0	Apparent	Nov-May	>60	---	Low	High	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
DoB---------------- Dogue	C	Rare--------	---	---	1.5-3.0	Apparent	Jan-Mar	>60	---	---	High-----	High.
EdD---------------- Edneytown	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
ErC, ErD----------- Evard	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
EsD*, EsE*:												
Evard------------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Cowee------------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
GrD*:												
Greenlee---------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Ostin------------	A	Occasional	Very brief	Dec-Apr	2.5-3.5	Apparent	Jan-Apr	>60	---	Low------	Low------	Moderate.
HaC2--------------- Hayesville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
HbE---------------- Hibriten	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	High.
MaB2, MaC2, MsB2, MsC2------------- Masada	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
MuC*:												
Masada-----------	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
Urban land.												
OsB---------------- Ostin	A	Occasional	Very brief	Dec-Apr	2.5-3.5	Apparent	Jan-Apr	>60	---	Low------	Low------	Moderate.
PaD, PcB2, PcC2---- Pacolet	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
PrC*, PrD*:												
Pacolet----------	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
Urban land.												

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Pt*. Pits												
PwD: Porters	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
RnD, RnE: Rion	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	High.
RsD*:												
Rion	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	High.
Ashlar	B	None	---	---	>6.0	---	---	20-40	Hard	---	Low	High.
RwC*:												
Rion	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	High.
Wedowee	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	High.
Rx*. Rock outcrop												
RzA*:												
Rosman	B	Occasional	Very brief	Dec-Apr	2.5-5.0	Apparent	Jan-Apr	>60	---	Moderate	Moderate	Moderate.
Reddies	B	Occasional	Very brief	Jan-Dec	2.0-3.5	Apparent	Dec-Apr	>60	---	Low	Low	Moderate.
StB: State	B	Rare	---	---	4.0-6.0	Apparent	Dec-Jun	>60	---	---	Moderate	High.
TaD: Tate	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
TcC*:												
Tate	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Cullowhee	B/D	Frequent	Very brief	Jan-Dec	1.5-2.0	Apparent	Nov-May	>60	---	Low	High	High.
ToA: Toccoa	B	Occasional	Brief	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---	---	Low	Moderate.
UdC*, UfB*:												
Udorthents.												
Urban land.												

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
WaC, WaD: Watauga	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
WeF*:												
Wateree	B	None	---	---	>6.0	---	---	20-40	Soft	---	Low	High.
Rion	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	High.
WhA: Wehadkee	D	Frequent	Brief	Nov-Jun	0-1.0	Apparent	Nov-May	>60	---	---	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING INDEX TEST DATA

(NP means nonplastic; LL, liquid limit; and PI, plasticity index)

Soil name, sample number, horizon, and depth in inches	Classification: Unified	Classification: AASHTO	Percentage passing sieve--: 3 in.	2 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: .02 mm	.005 mm	.002 mm	LL	PI	Moisture density: Maximum dry density	Optimum moisture
														Pct		Lb/ft[3]	Pct
Buncombe loamy sand[1]: (S84NC-193-002)																	
Ap----- 0 to 8	SM	A-2-4(0)	100	100	100	99	99	98	88	25	13	7	6	25	NP	105.6	15.4
C2----- 18 to 60	SM	A-2-4(0)	100	100	100	100	100	100	92	14	7	5	4	23	NP	101.0	15.8
Masada sandy clay loam[2]: (S84NC-193-007)																	
Ap----- 0 to 8	CL	A-4(5)	100	100	100	99	99	99	93	58	38	29	22	25	8	115.0	14.3
Bt1---- 8 to 35	CH	A-7-6(18)	100	100	100	100	100	100	96	75	63	58	54	53	28	101.4	22.1
Bt3---- 49 to 60	MH	A-7-5(11)	100	100	99	96	95	94	88	65	57	52	50	52	17	97.2	22.6
Pacolet sandy clay loam[3]: (S84NC-193-005)																	
A------ 0 to 4	ML	A-7-5(6)	100	100	95	93	91	91	89	61	42	30	22	42	11	89.7	24.6
Bt----- 8 to 29	MH	A-7-5(18)	100	100	100	100	100	100	99	79	66	55	48	56	26	91.0	30.2
C------ 44 to 60	ML	A-5(8)	100	100	100	100	100	100	98	74	45	20	14	43	7	93.8	23.2
Toccoa sandy loam[4]: (S84NC-193-003)																	
Ap----- 0 to 8	SM	A-2-4(0)	100	100	100	100	100	100	99	30	14	9	7	27	NP	102.0	17.0
C1---- 8 to 55	SM	A-4(1)	100	100	100	100	100	100	97	41	17	11	9	28	NP	104.5	17.2

[1] The soil is the typical pedon for the soil series in the survey area. For the location of the pedon, see the section "Soil Series and Their Morphology."

[2] Location of sample is, from Ronda, North Carolina, 1.3 miles south on Roundabout Farm Road, 50 feet east of the road, 1,500 feet north of the Yadkin River, in a cultivated field. The Bt horizon in this pedon is thicker than normal for the Masada soils.

[3] Location of sample is, from Wilkesboro, North Carolina, 6 miles west on U.S Highway 421, about 1.3 miles southeast on Secondary Road 1145 to Smithey Creek Access Area at W. Kerr Scott Reservoir, 40 feet east of the road, in a wooded area.

[4] Location of sample is, at Wilkesboro, North Carolina, where U.S. Highway 421 crosses the Yadkin River, 200 feet west of the highway, 250 feet northwest of the confluence of Moravian Creek and the Yadkin River, in a cultivated field.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Ashlar	Coarse-loamy, mixed, thermic Typic Dystrochrepts
Bethlehem	Clayey, kaolinitic, thermic Typic Kanhapludults
Braddock	Clayey, mixed, mesic Typic Hapludults
Buncombe	Mixed, thermic Typic Udipsamments
Chandler	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Cleveland	Loamy, mixed, mesic Lithic Dystrochrepts
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Cullasaja	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Cullowhee	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Haplumbrepts
Dogue	Clayey, mixed, thermic Aquic Hapludults
Edneytown	Fine-loamy, mixed, mesic Typic Hapludults
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Greenlee	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Hayesville	Clayey, kaolinitic, mesic Typic Kanhapludults
Hibriten	Loamy-skeletal, mixed, thermic Typic Hapludults
Masada	Clayey, mixed, thermic Typic Hapludults
Ostin	Sandy-skeletal, mixed, mesic Typic Udifluvents
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Porters	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Reddies	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Haplumbrepts
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Rosman	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Saluda	Loamy, mixed, mesic, shallow Typic Hapludults
State	Fine-loamy, mixed, thermic Typic Hapludults
Tate	Fine-loamy, mixed, mesic Typic Hapludults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Udorthents	Udorthents
Watauga	Fine-loamy, micaceous, mesic Typic Hapludults
Wateree	Coarse-loamy, mixed, thermic Typic Dystrochrepts
Wedowee	Clayey, kaolinitic, thermic Typic Kanhapludults
Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents

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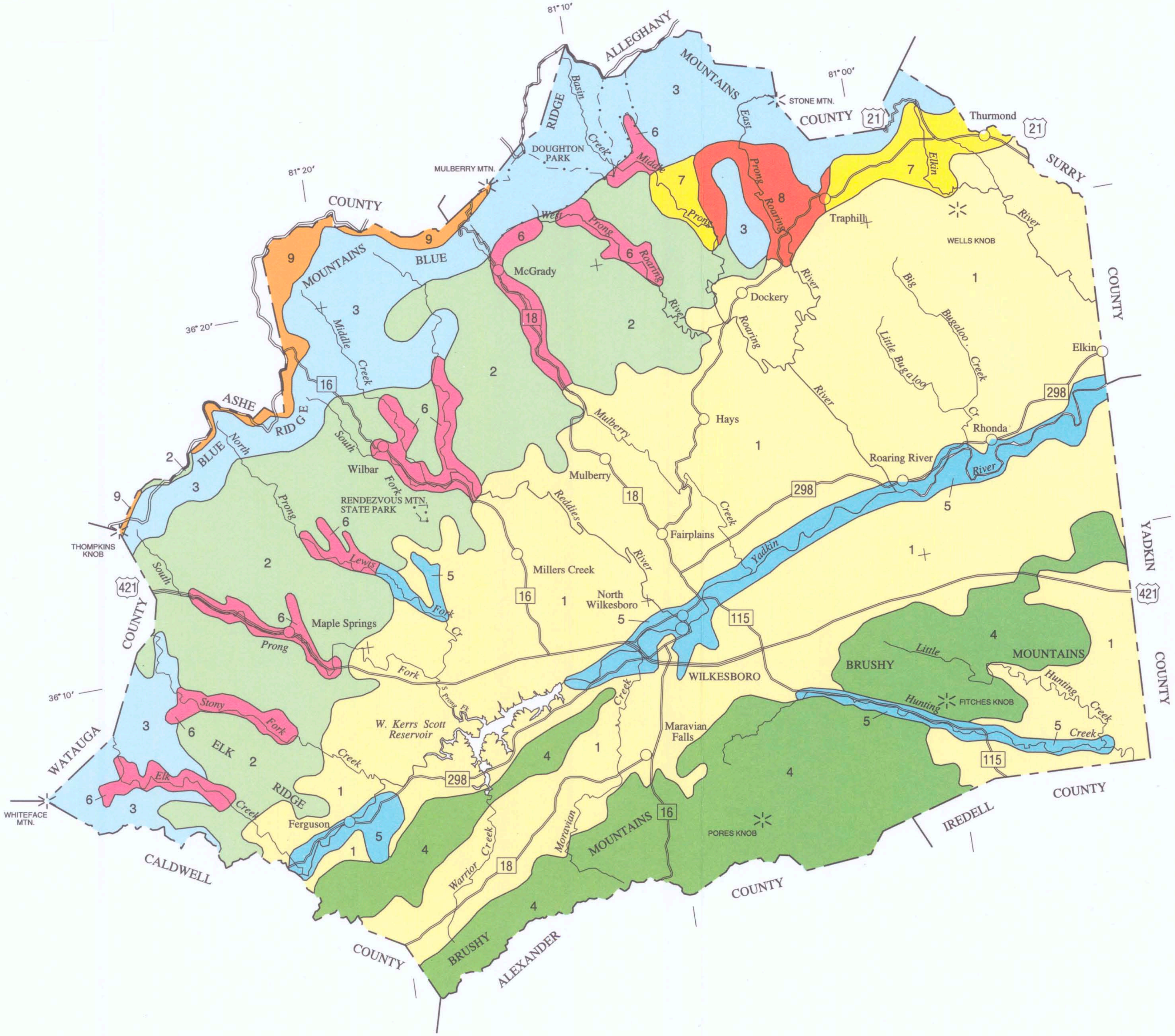
NOTE:
Hwy. 268
Mistakenly Labeled
as Hwy. 298



SOIL LEGEND*

1	Pacolet-Rion
2	Evard-Cowee-Chestnut
3	Chestnut-Ashe-Edneyville
4	Evard-Cowee
5	Toccoa-Masada
6	Tate-Braddock-Rosman-Cullowhee
7	Pacolet-Masada
8	Rion-Wedowee
9	Chandler-Watauga-Chestnut

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1996

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
NORTH CAROLINA AGRICULTURAL SERVICE
NORTH CAROLINA COOPERATIVE EXTENSION SERVICE
WILKES SOIL AND WATER CONSERVATION DISTRICT
WILKES COUNTY BOARD OF COMMISSIONERS

GENERAL SOIL MAP

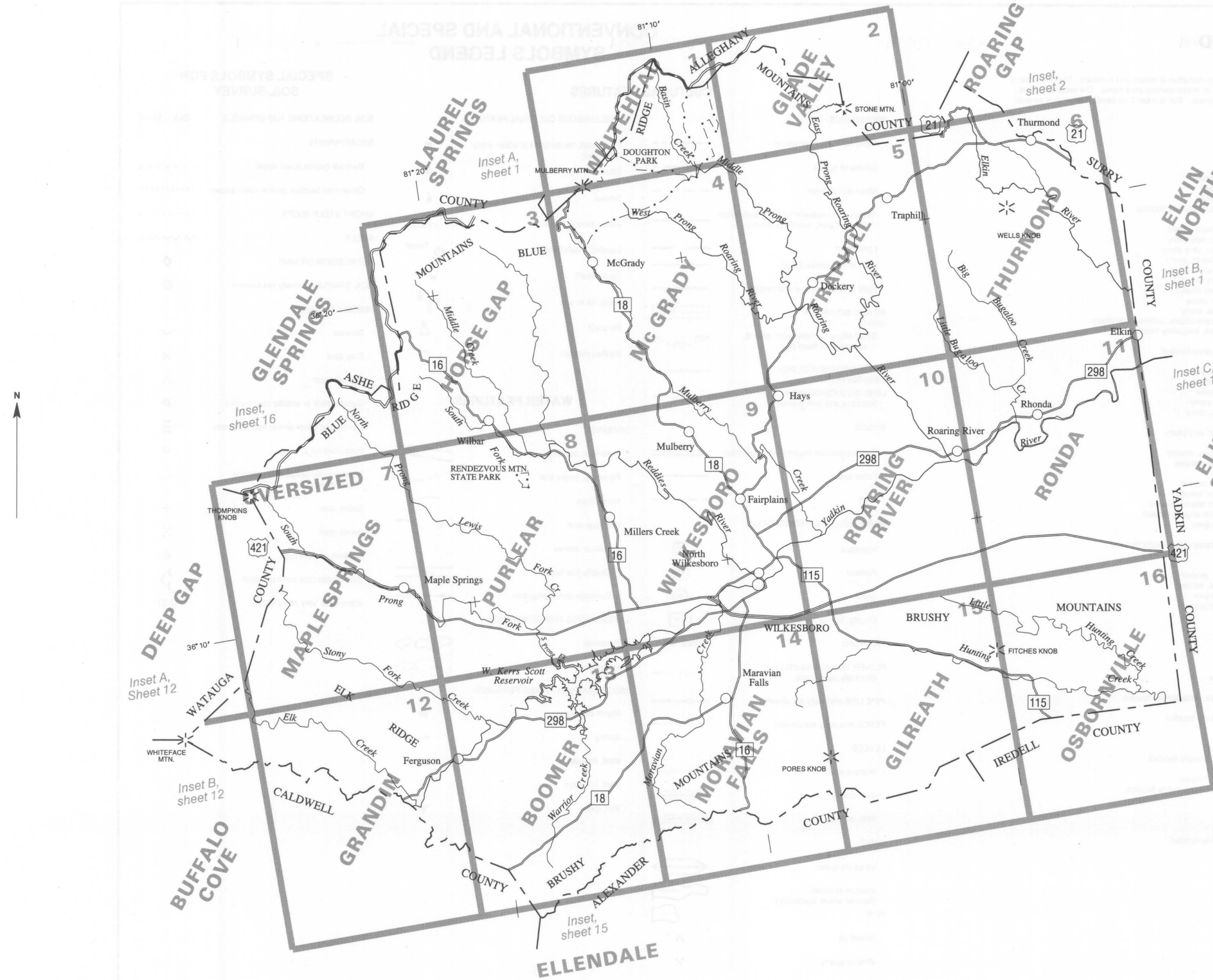
WILKES COUNTY, NORTH CAROLINA

Scale 1:253440

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

WILKES COUNTY, NORTH CAROLINA

Scale 1:253440

1 0 1 2 3 MILES

1 0 1 2 3 4 5 6 KILOMETERS

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

WILKES COUNTY, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA COOPERATIVE EXTENSION SERVICE
WILKES SOIL AND WATER CONSERVATION DISTRICT
WILKES COUNTY BOARD OF COMMISSIONERS

SOIL LEGEND

Map unit symbols and names are alphabetical. Map symbols are letters or a combination of letters and numbers. The first letter is capitalized and is the first letter of the soil series, higher level of classification, or miscellaneous area name. The second letter is lowercase. The third letter, where used, is capitalized and denotes the slope phase. The number 2 us used at the end of several map unit symbols and denotes a moderately eroded phase.

SYMBOL	NAME
BhC	Bethlehem-Hibriten complex, 6 to 15 percent slopes
BrB2	Braddock clay loam, 2 to 8 percent slopes, eroded
BrD2	Braddock clay loam, 8 to 25 percent slopes, eroded
BuB	Buncombe loamy sand, 0 to 6 percent slopes, occasionally flooded
CdF	Chandler gravelly fine sandy loam, 25 to 80 percent slopes
CeD	Chestnut-Ashe complex, 8 to 25 percent slopes, very stony
CeF	Chestnut-Ashe complex, 25 to 90 percent slopes, very stony
ChD	Chestnut-Edneyville complex, 8 to 25 percent slopes, stony
ChE	Chestnut-Edneyville complex, 25 to 60 percent slopes, stony
CkA	Chewacla loam, 0 to 2 percent slopes, frequently flooded
CrF	Cleveland-Rock outcrop complex, 8 to 90 percent slopes
CsD	Cowee-Saluda complex, 8 to 25 percent slopes, stony
CsE	Cowee-Saluda complex, 25 to 60 percent slopes, stony
CuE	Cullasaja very cobbly sandy loam, 15 to 60 percent slopes, extremely bouldery
CwA	Cullowhee fine sandy loam, 0 to 3 percent slopes, frequently flooded
DoB	Dogue fine sandy loam, 1 to 6 percent slopes, rarely flooded
EdD	Edneytown gravelly sandy loam, 8 to 25 percent slopes
ErC	Evard gravelly sandy loam, 6 to 15 percent slopes
ErD	Evard gravelly sandy loam, 15 to 25 percent slopes
EsD	Evard-Cowee complex, 8 to 25 percent slopes, stony
EsE	Evard-Cowee complex, 25 to 60 percent slopes, stony
GrD	Greenlee-Ostin complex, 3 to 40 percent slopes, very stony
HaC2	Hayesville sandy clay loam, 6 to 15 percent slopes, eroded
HbE	Hibriten very cobbly sandy loam, 15 to 45 percent slopes
MaB2	Masada sandy clay loam, 2 to 8 percent slopes, eroded
MaC2	Masada sandy clay loam, 8 to 15 percent slopes, eroded
MsB2	Masada gravelly sandy clay loam, 2 to 8 percent slopes, eroded
MsC2	Masada gravelly sandy clay loam, 8 to 15 percent slopes, eroded
MuC	Masada-Urban land complex, 2 to 15 percent slopes
OsB	Ostin very cobbly loamy sand, 1 to 5 percent slopes, occasionally flooded
PaD	Pacolet sandy loam, 15 to 25 percent slopes
PcB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded
PcC2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded
PrC	Pacolet-Urban land complex, 2 to 15 percent slopes
PrD	Pacolet-Urban land complex, 15 to 25 percent slopes
Pt	Pits, quarries
PwD	Porters loam, 15 to 25 percent slopes, stony
RnD	Rion fine sandy loam, 15 to 25 percent slopes
RnE	Rion fine sandy loam, 25 to 60 percent slopes
RsD	Rion-Ashlar complex, 15 to 35 percent slopes
RwC	Rion-Wedowee complex, 5 to 15 percent slopes
Rx	Rock outcrop
RzA	Rosman-Reddies complex, 0 to 3 percent slopes, occasionally flooded
StB	State fine sandy loam, 1 to 6 percent slopes, rarely flooded
TaD	Tate fine sandy loam, 8 to 25 percent slopes
TcC	Tate-Cullowhee complex, 0 to 25 percent slopes
ToA	Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded
UdC	Udorthents-Urban land complex, 1 to 15 percent slopes
UfB	Udorthents-Urban land complex, 1 to 6 percent slopes, rarely flooded
WaC	Watauga loam, 8 to 15 percent slopes
WaD	Watauga loam, 15 to 25 percent slopes
WeF	Wateree-rion complex, 40 to 95 percent slopes
WhA	Wehadkee loam, 0 to 2 percent slopes, frequently flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 19
- Federal — 410
- State — 52
- County, farm or ranch — 1287

RAILROAD — NAME ONLY

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable) — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water
- Intermittent — int

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CkA MaC2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

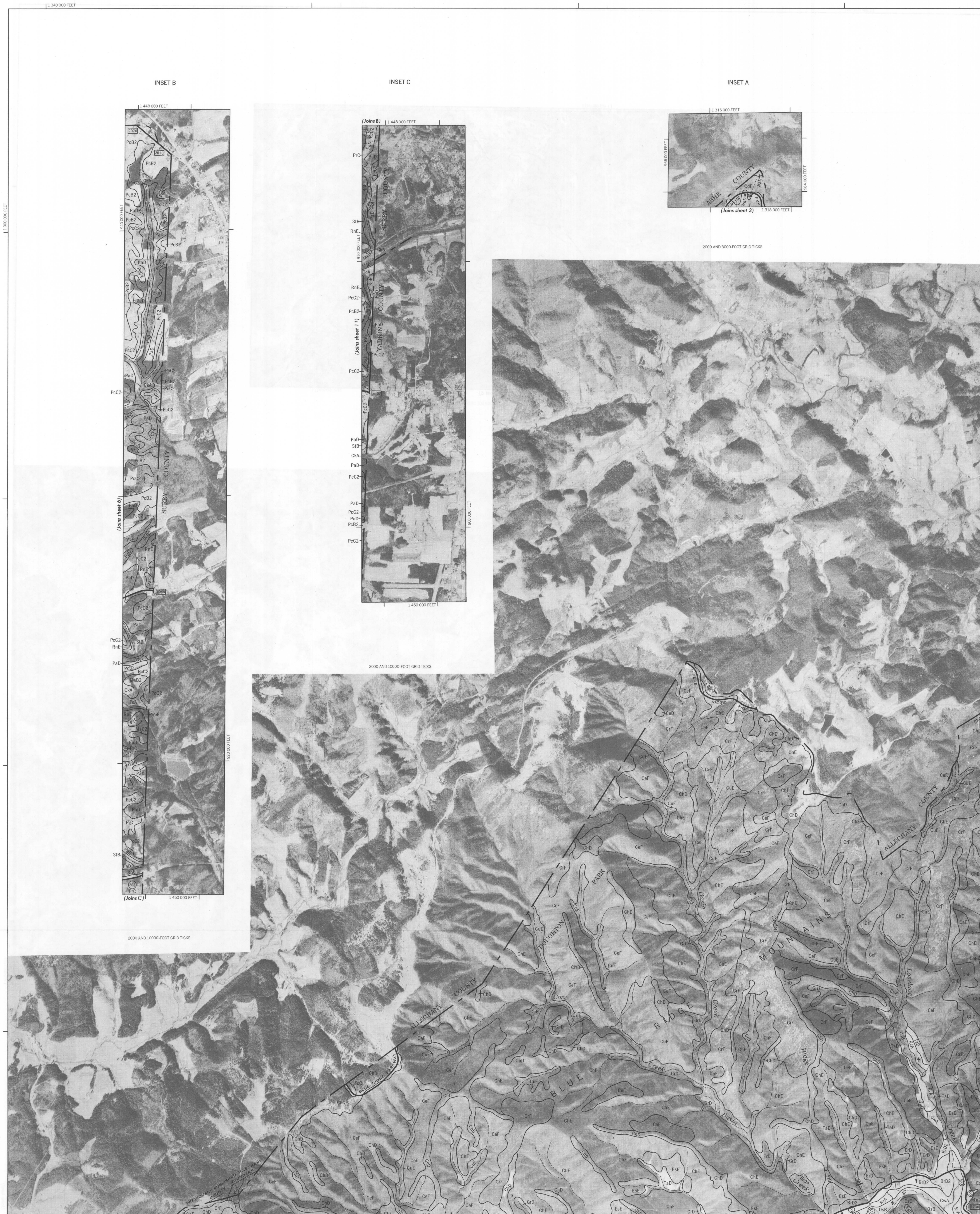
GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot



5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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5000 AND 10000-FOOT GRID TICKS

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 2 3 Kilometers
Scale - 1:24000

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Scale - 1:24000

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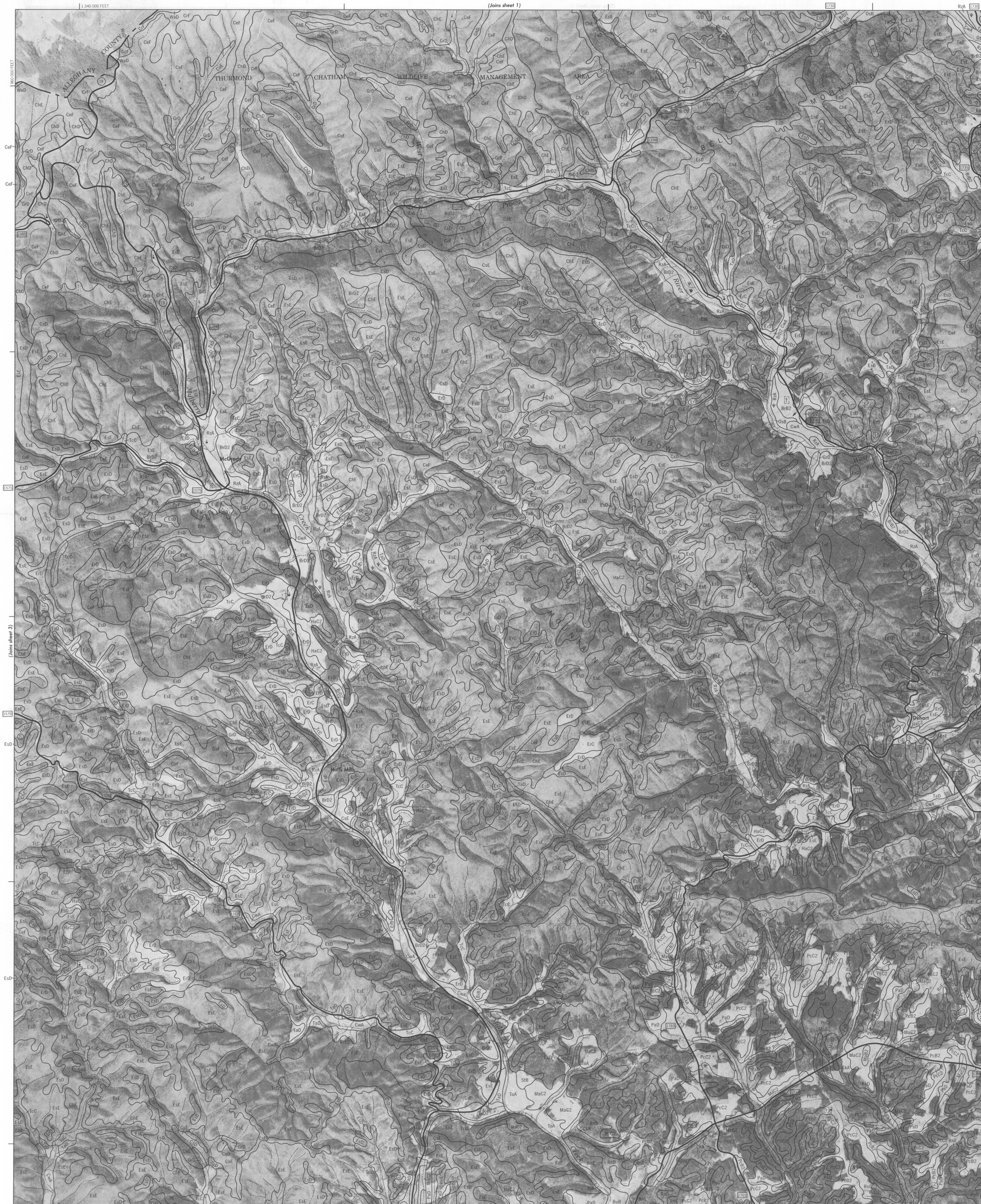

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1 .5 0 1 2 3 Kilometers
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SHEET NUMBER 5
WILKES COUNTY, NORTH CAROLINA

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Scale - 1:24000

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(Joins inset, sheet 2)

(Joins sheet 5)

(Joins inset, sheet 1)

(Joins sheet 11)

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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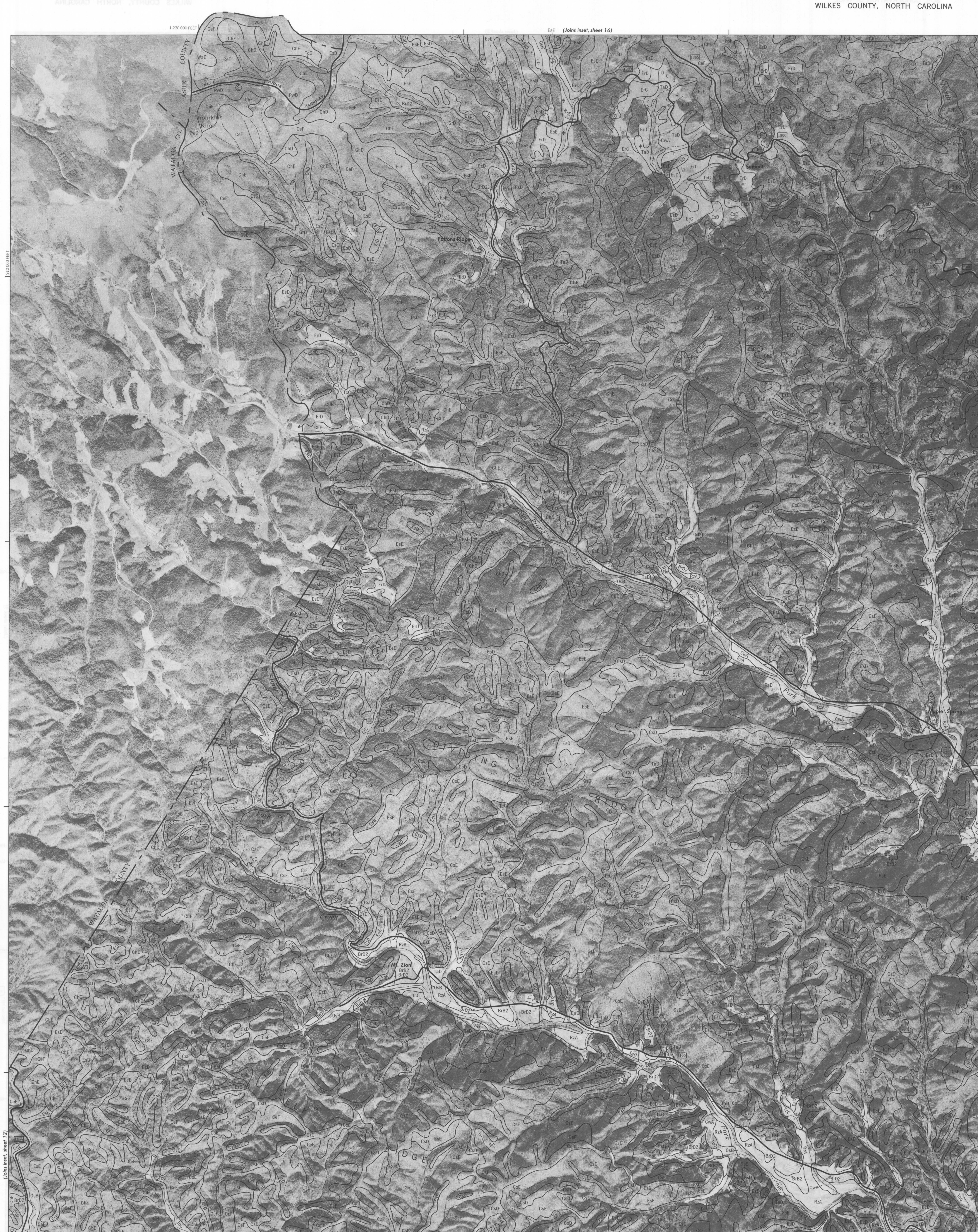

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1 .5 0 1 2 3 Kilometers
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1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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Scale - 1:24 000

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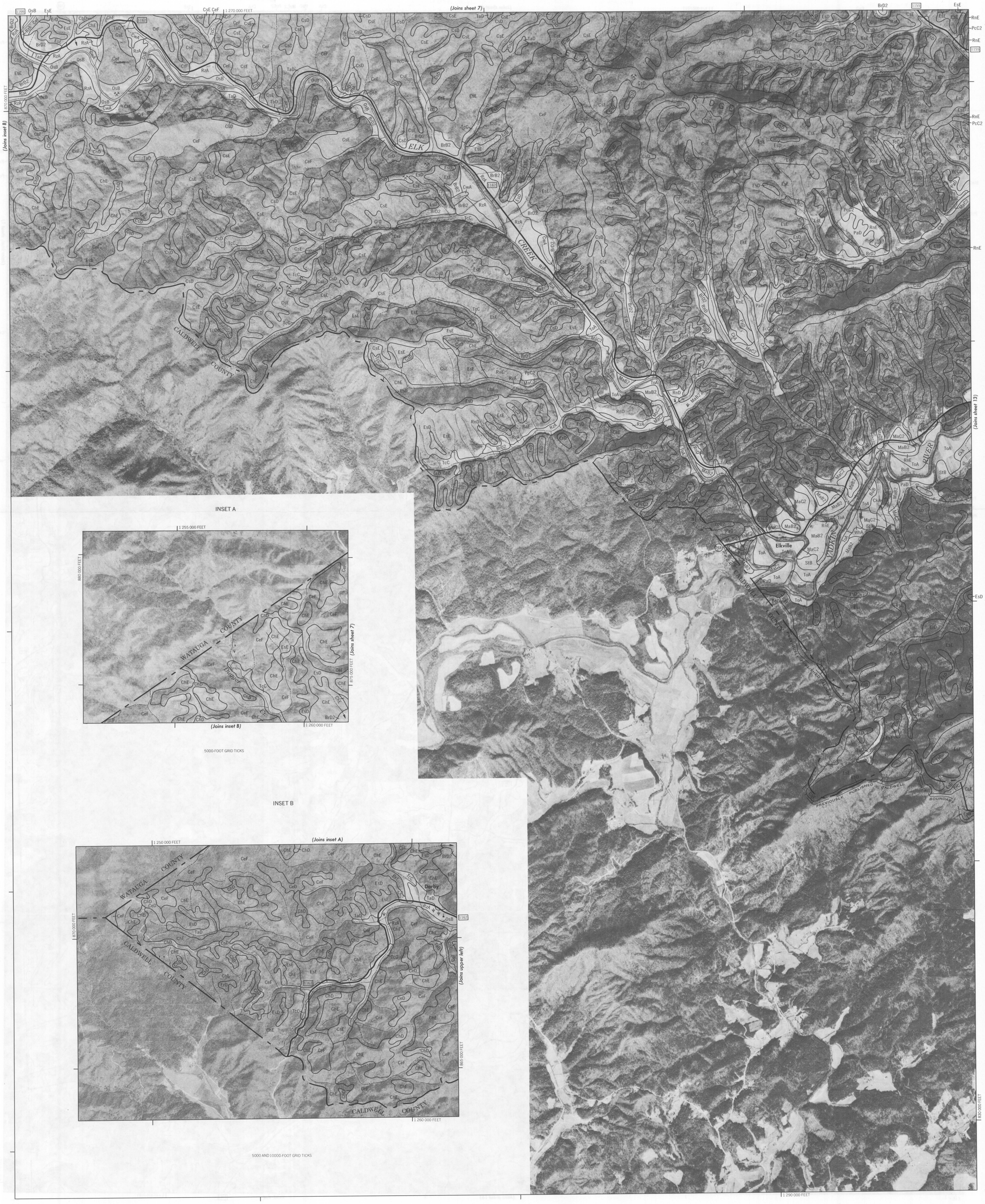

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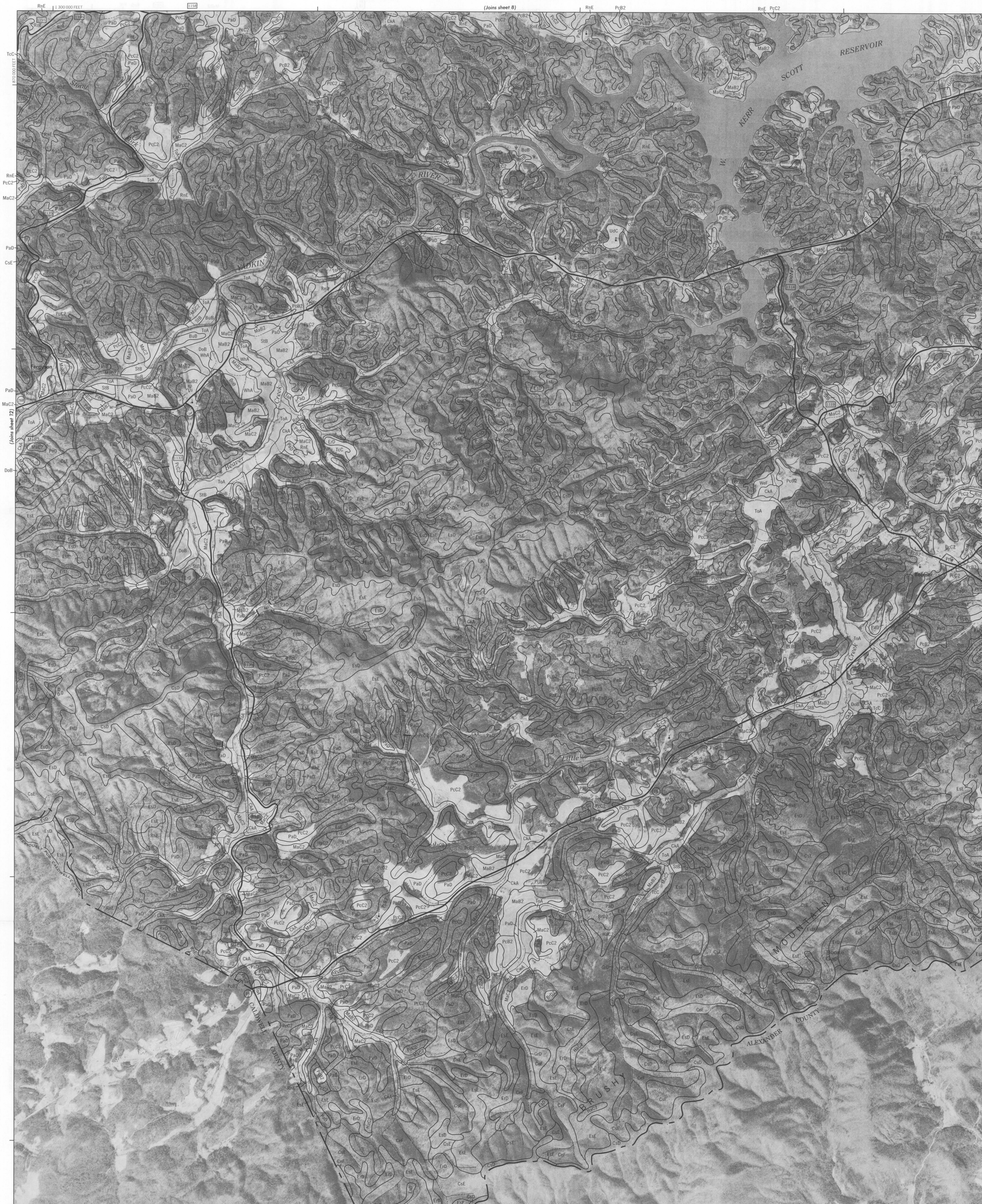
SHEET NUMBER 13
WILKES COUNTY, NORTH CAROLINA



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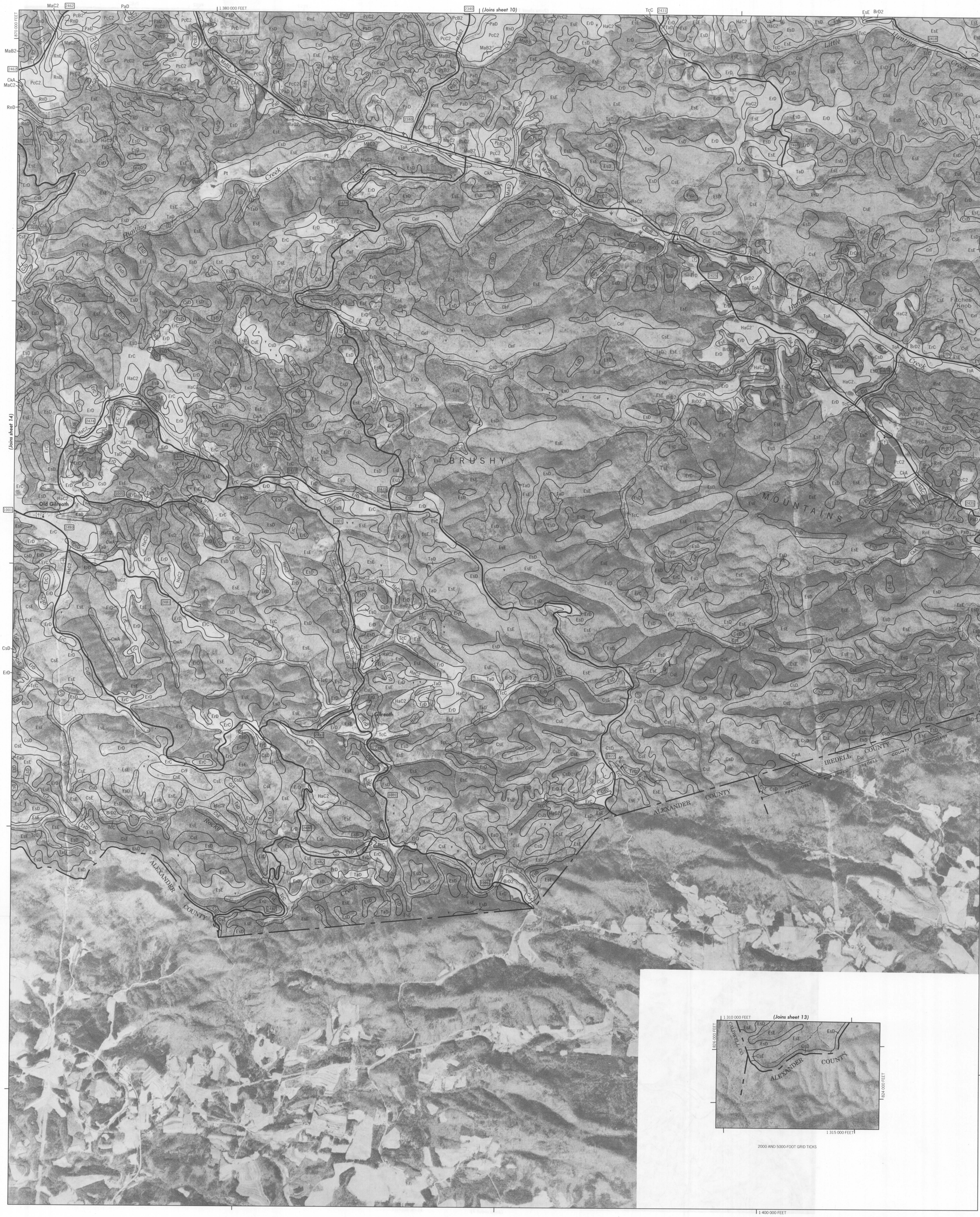
SOIL CONSERVATION SERVICE



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